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Volume 1 JUNE, 1937 Number 9

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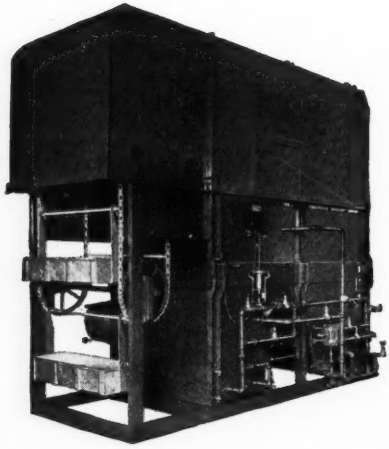

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CINCINNATI, OHIO VOL. 1, No. 9

JUNE, 1937

Pyrene Pioneers Profitable Plating Practice

In this article the author explains how a small investment in additional equipment returned large dividends from a wider range of plating operations.

BY EDWIN SMITH

THE modern production methods in use in the shop today have placed almost incredible requirements on the machine parts and cutting tools used in machining operations and have at the same time given tool engineers the difficult problem of developing tools hard enough and tough enough to meet those requirements. Alloys have been developed and plating to achieve wear-resistance has been attempted with a marked degree of success. Experiments with chromium revealed its low coefficient of friction, its hardness and its high resistance to attack by almost all organic and inorganic compounds, except muriatic and sulphuric acids. In other words, chromium plating was found to provide a desirable wearing surface on mechanical equipment and prolong the life of cutting tools to which it was applied.

A vast field of new business awaits the plater who will make an effort to develop his market for wear resisting or industrial chromium plating. This new business can in most cases be obtained without necessitating the making of a great investment in equipment, neither is it necessary to start an advertising campaign. However, a certain amount of equipment in addition to that which is used for decorative chromium plating is required.

The profitable business of plating small tools and parts can usually be found at the plater's very doorstep. A situation such as this confronted Mr. L. E. Eckelman, manager of the Metal Finishing Division of Pyrene Mfg. Co., when he first decided to offer his services in the field of in-

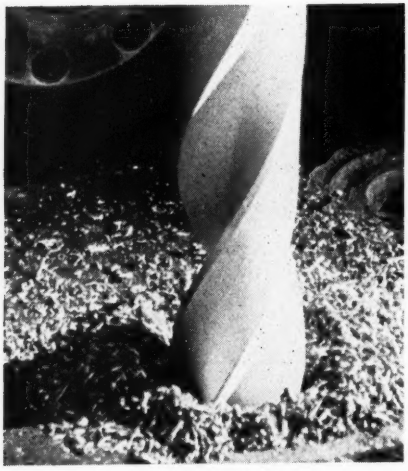

Fig. 1—Chromium plated drills are successful in many applications, frequently giving seven or eight times the production of unplated drills.

dustrial chromium plating.

All of the first industrial chromium plating jobs that came to Pyrene came from firms for which it had been doing either chromium plating for decorative purposes or other types of plating. In most instances, these earlier jobs involved salvaging work which for one reason or another had been machined or ground undersize, the task consisting of plating the parts with chromium of sufficient thickness to permit grinding to the desired size.

Some of this work turned out to be very difficult. One of the first jobs involved the deposition of a layer of chromium 0.002 in. thick on a short cylinder which had a narrow shoulder at one end. The difficult part of this job was to cover the entire surface of the cylinder and into the angle formed by the shoulder. After a special anode was made which permitted the use of a higher current density without burning, the problem was virtually solved.

Another job involved about 250 heavy forgings which had been completely machined. These forgings consisted of 2 in. shafts about 18 in. in length, at one end of which was a 12-in. spur gear. Through an error, the bearing surface on the shaft had been ground about 0.004 in. too small. To make new parts would have involved not only considerable expense but also a delay of several weeks. At Pyrene, a simple method was worked out and the entire 250 pieces were completed in record time.

So satisfactorily did the first few salvage jobs turn out that Pyrene decided to turn its attention toward the chromium plating of cutting tools. Since that time, Pyrene en-

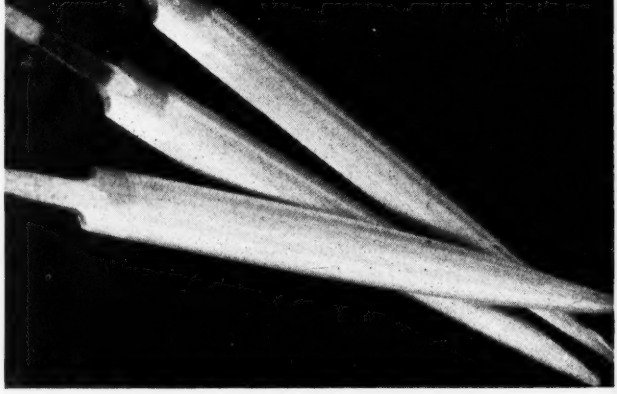

Fig. 2—Files are chromium plated to increase both corrosion and wear resistance.

gineers have chromium plated and tested practically every type of cutting tools in existence. The tools that have been plated in the largest quantities are drills, reamers, taps, milling cutters, endmills, counterboring tools and forming tools of various designs such as are used on turret lathes or on automatic machines. The cutting tools mentioned are being used to cut ferrous as well as nonferrous metals such as brass, copper, aluminum, and die-cast zinc. They are also used in the cutting of materials such as bakelite, hard rubber, wood, marble, and slate. It is readily discernible that cutting tools plated by Pyrene are finding application in machining practically all of the materials used in industry.

Plating small cutting tools with chromium has fitted very well into the daily plating schedule at the Pyrene plant. The plated cutting tools do not require polishing, copper plating, or nickel plating. The workpieces can be hung in the plating tanks on wires or arranged on suitable racks, depending upon the types that are handled. The usual plating time varies from five to fifteen minutes.

The results obtained with chromium plated tools as reported by the users varies from plant to plant. For instance, one company reported that production was doubled by the use of chromium plated drills in machining work of heat-treated alloy steel and another multiplied production two to three times with mild steels and six to eight times on brass forgings.

Fig. 3—Chromium plated cutters that are used for a variety of purposes give several times the service of unplated cutters, particularly when cutting non-metallic materials.

An interesting report from one concern stated that chromium plated files were much better cared for by the employees than unplated files. In addition to increased production through the use of the plated files, it was not necessary to issue as many chromium plated files to the shop for a given amount of production as had been

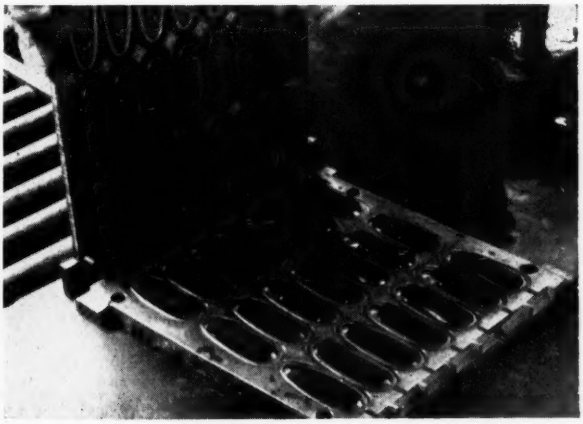

Fig. 4 — Chromium plated molds for molding hard rubber and plastics do not pit from contact with sulphur, do not rust in storage, and are not attacked by the plastic material.

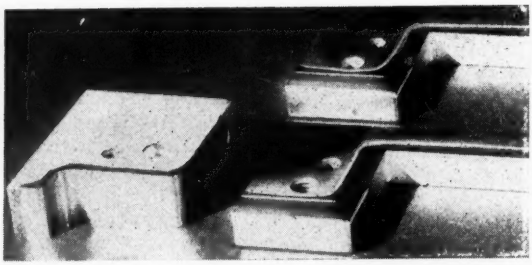

Fig. 5—Metal forming dies are plated to increase their life and reduce scoring. Chromium does not cold-weld to other metals.

customary before chromium plating was adopted. Another concern reported three to four times the production with plated files than had been possible with unplated files. In the case of chromium plated milling cutters, two to four times the service of unplated tools was obtained.

Another class of work upon which Pyrene has specialized with great success consists of the molds and dies used in molding hard rubber and plastics. Their customers report that chromium plating on these molds has some very real advantages. Pitting of the surface by sulphur compounds is eliminated; rubber and other plastics do not stick to the chromium surface; corrosion of the mold while in storage between runs is eliminated; wear in the mold cavities is much reduced, resulting in greatly increased life; and, finally, some types of plastics corrode steel so rapidly that stainless or chromium plated ordinary steel must be used.

There is nothing approximating production in handling molds and dies. To properly plate each piece requires thought, care, and attention to detail.

Fig. 6—Illustration showing a worm for an extrusion apparatus that has been plated to reduce wear and corrosion.

Anodes must be properly built to assure the deposition of an even amount of chromium over the entire surface and usually a certain amount of careful buffing is required before the part is assembled with the anode and after the chromium has been plated.

Pyrene has found it to be quite advantageous, in quoting a customer for this type of work, to divide the quotation into two parts—one quotation for the actual plating work and the other for the anodes and fixtures which must be built to handle the

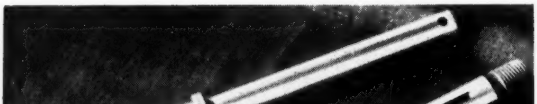

Fig. 7—Illustration showing water-pump shafts which have been chromium plated to reduce wear and corrosion. Chromium plating reduces packing renewals for these shafts.

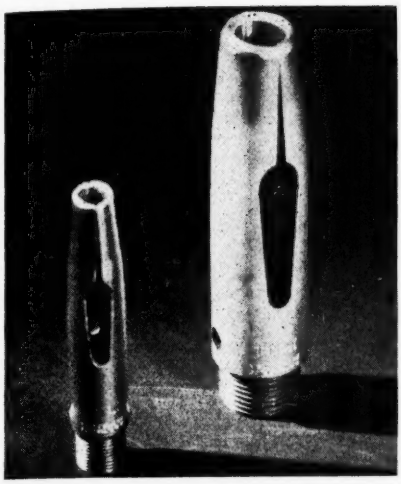

Fig. 8—Feeding fingers for automatic screw machine are chromium plated to reduce scoring of stock and to give increased life.

job. Billing in this manner allows the customer to see exactly what the plating costs him, as distinct from the preparation cost of the job. If he should have another mold of similar size and shape to be plated, the anode built for the first molds can, with a few slight modifications, be used for the second one. Naturally, the cost of the fixtures for the second one will be very much less and by separating the costs of the fixtures and of plating, many a discussion about variable plating costs on what appears to be two similar parts can be prevented.

On some parts it is necessary to plate an excess of 0.001 in. to 0.002 in. so the customer can grind to size. On many parts, such as spindles, arbors and some gears, chromium may be plated to the thickness required with sufficient accuracy to avoid the necessity of any finishing beyond a light buffing.

The thickness of chromium used on parts subject to wear varies much with the service expected. Some small parts used on textile winding machinery may have three to four times the life of unplated parts with only 0.0002 in. of chromium. Another part used on the same machine may require a thickness of 0.001 in. or more to give best results.

Spindles of grinding machines are usually plated oversize and ground back to exact size, leaving chromium between 0.002 in. to .003 in. thick. Parts on packaging and wrapping machines are often plated with 0.003 in. to 0.005 in. chromium to protect them from corrosion as well as wear.

Parts plated with chromium by Pyrene to a thickness of 0.001 in. to 0.005 in. are being used on many other types of machines, including pumps for gases, liquids and semi-solids, pneumatic tools, airplane engines, can making and filling machinery, cereal processing equipment

Fig. 9—Thread guides for textile machinery are chromium plated to reduce friction and to provide a corrosion resisting surface from the moist atmosphere of textile mills.

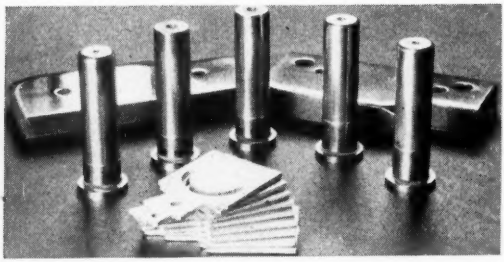

Fig. 10—Punches, forming dies, and so on are chromium plated to prevent wear.

and machines used in the tobacco and leather working industries.

Dumore Hand Grinders. The Dumore Company, Dept. 187-A, Racine Wis., announces the second of its catalog series —"Dumore Hand Grinders". This catalog comprises eight pages of descriptions and illustrations in color showing the various types of hand grinders made by this firm and the manner in which they are used to finish small radii and irregular shapes, to correct inaccuracies in blanking dies, to touch up taps and cutters, to sharpen dinking dies, button dies, and acorn dies, to lap small holes, for various kinds of grinding, drilling, sanding, polishing and so on. Four different types of hand grinders are presented together with specifications. Included also are illustrations and specifications of the different types and sizes of mounted wheels and abrasive bands and arbors that are available for use with these grinders. A copy of this catalog is available upon request.

Clark Lift-Jack Units. The modern method of loading, handling and storing materials on skids and the manner in which these skids can be handled by the use of Clark Lift-Jacks is discussed in a six-page folder now being issued by All Steel Welded Truck Corporation, 1123 Railroad Ave., Rockford, Ill. Copy free upon request.

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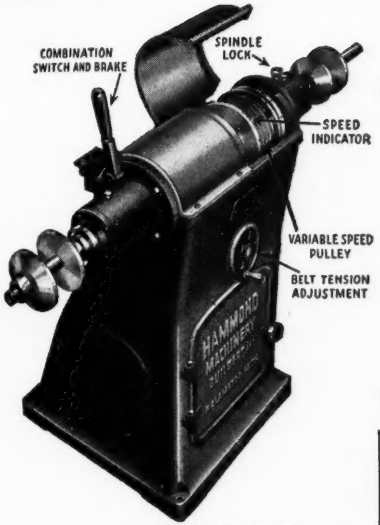

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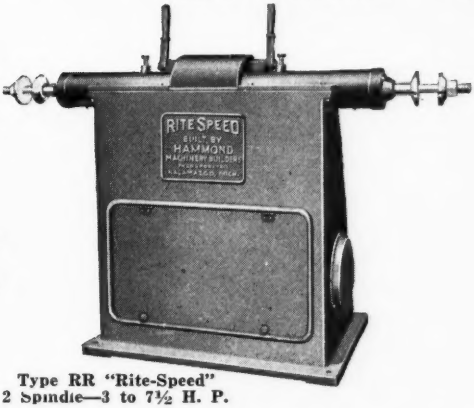

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Aluminum Finishing Procedure, Part II

By Robert T. Griebling
Aluminum Company of America

EVER since the art of etching and dry pointing originated, the copper plate was considered the most desirable medium for the execution of the design, from a standpoint of performance as well as cost.

Yet the copper plate had a number of disadvantages which have only been corrected in recent years, not by the improvement of the plate itself, but by the substitution of aluminum. It is not the purpose of this article to digress into a discussion of the etcher's problems, but to show how the selection of a proper metal finish helped to solve a difficulty which had baffled artists for many years.

A perfect printing plate is one which is light in color, for then it is easy on the eyes. The metal itself should be grained in such a way that the dry point tool can cut into it without difficulty and that the same depth of line may be obtained by an even pressure on the tool. The surface should, at the same time, be hard enough so that it is possible to print a large edition. The high price of some etchings or dry points is due to the fact that only a small number can be printed before the plate becomes unfit for use.

Aluminum has the desired quality of light color, but considerable research had to be carried on to produce the other advantages, just listed, as well. The base of the new artists' plate is an aluminum alloy in order to give a stiffness which would not be distorted in the printing press. Over this was imposed a sheet of pure metal to give the necessary softness in which the dry point needle can move smoothly. Then the surface of the pure metal was given a high buff and a chemical dip, which produced a milky finish. All this work was finally covered with an Alumilite coating, one of the electrolytic oxide finishes which can be formed on aluminum. This coat-

Fig. 1—Dry point, by P. R. L. Hogner, Pittsburgh artist and architect, made of the Central American Indian. Note the furry, velvety softness, produced by high burr raised from metal at various points in the print, particularly around the cap and eyes.

ing is very hard, but it is also very thin. The hardness permits many impressions to be made from the same plate. The extreme thinness allows the dry point tool to cut through easily. When etching on such a plate, the surface must first be slightly dry pointed to give the acid a start, for the coating is not affected by such etching solutions as perchloride of iron or stannic chloride.

The hard corundum-like coatings which are formed on aluminum by electrolysis—and which can be formed only on aluminum—are among the most durable of known finishes. They have high resistance to corrosion, high dielectric strength, high reflectivity, good adsorption for dyes and mineral pigments, and can be made most attractive. The properties of the coatings vary, depending upon the composition of the metal, the composition of the electrolyte, the temperature, the operation voltage, and the time of treatment.

The electrolytic coating of aluminum has been compared to electroplating, principally because the article to be treated is immersed in a bath of special composition through which an electric current is passed. Yet the two processes are not alike. In electroplating, the piece to be coated is the cathode, while in the electrolytic treatment of aluminum the piece is the anode (whence come the terms **anodic coating, anodic treatment,** and so on). Oxygen, instead of metal, is deposited on the surface. This combines with aluminum to form aluminum oxide, and the combination is integral with the surface of the metal.

Of all the anodic treatments, the Alumilite process is one of the most practical. Resistance to abrasion is one of its outstanding characteristics,

Fig. 2—The Navy and Marine Memorial, Washington, D. C. This statue was cast in aluminum and sculptured by Begni del Piatta. Various parts have been treated by the Alumilite process; thus the wave itself is a rich green, while the foam on the crest and the upper parts of the gulls have been tinted a bright golden color, making the group appear as though bright sunlight were falling upon it.

and because of this, aluminum treated by the Alumilite process is used in cafeteria trays, street car handrails, automobile pistons, and numerous other applications where hard surfaces are essential.

The Alumilite process further imparts to the metal a high resistance to corrosion, and can be nowhere better illustrated than in kitchen refrigerators. One look at the ice cube trays with which refrigerators were equipped six or seven years ago will show what happens when metallic surface protection gradually wears away. When unprotected metal is allowed to come in contact with water for prolonged periods, as is the case in the freezing of ice cubes, chemical attack occurs, making the appearance of the

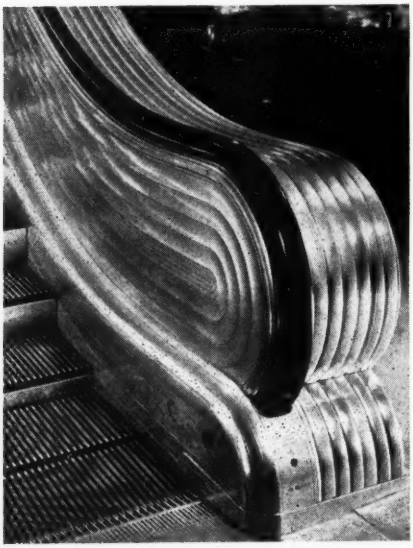

Fig. 3—Escalator railing in Mandel Brothers, Chicago. Note the surface of the metal—its shimmering beauty is preserved by the Alumilite process.

metal unsightly.

This is not the case with aluminum trays, however, when they have been given an application of the Alumilite finish and this is but one reason why aluminum ice cube trays are found in practically every make of refrigerator.

When the resistance to corrosion of aluminum surfaces must be even greater than in ice cube trays, the coating is usually sealed with a dichromate solution. This can, however, only be used where its color—a light yellow—is not objectionable. It is by far the best sealer, but where it cannot be used, there are other sealing processes available proving useful for architectural parts, such as store front trim. The requirements for a good store front metal are simple. It must retain its original appearance as long as possible. Store front moldings treated by the Alumilite process can be cleaned by a mere washing down with water. In stubborn cases, soap can be added. The coating protects the metal to such an extent that its light color is retained for years.

Protection from abrasion and corrosion is the principal value of an electrolytic oxide coating, but the quality that lends flash and news value to the Alumilite process consists in the fact that the Alumilite coatings can adsorb dyes and pigments. When the Alumilite-finished article is immersed in a suitable dye bath, the dye penetrates into the coating giving deep colors with an attractive underlying metallic sheen. Some of the articles colored in this manner are cocktail shakers, cigarette and vanity cases, automatic pencils, fountain pen parts, and aluminum inlay.

The use of dyed aluminum is best confined to those commodities which are not constantly exposed to the weather, for dyed coatings, just as dyed fabrics, will eventually fade under such conditions. A greater light fastness is possessed by mineral pigments, although their colors are not as brilliant nor do they produce the translucent effects of dyes, and they are used in more severe service requirements. They may at present be found on lamp standards for bridges, on statuary, and on architectural applications.

When treating various parts of aluminum, which later must be fitted together, by the Alumilite process, it is well to remember that an accurate color match is often required. The appearance of an Alumilite finish is affected by the original surface of the metal, such as buffing, frosting, satin finishing, and sandblasting, and it is therefore important that the proper surface preparation is employed before the metal is subjected to the Alumilite process.

The appearance is further affected by alloy composition. The color of the Alumilite finish is usually lighter when an alloy has been heat treated than when it has not been heat treated. Alumilite finishes over pure aluminum have an attractive silvery white appearance, while on an aluminum-silicon alloy they have a deep gray tone which sometimes seems almost black. Chromium gives the finish a yellowish cast. Because of these variants, care must be exercised when making up an assembly of different alloys if the shades of color are either to match or to harmonize. This is particularly true in the case of architectural applications, where it is generally necessary to employ parts fabricated in various ways, which, in the structure, are quite often adjacent to each other.

The appearance of the aluminum surface is further affected by the type of fabrication. The color of a casting and of a wrought product, both made of the same alloy, may look alike to the naked eye before being treated by the Alumilite process. Once the coating is formed, however, there may be a difference in appearance of several shades between the two products. This must be remembered in the case of welding. A weld may join two pieces of sheet—wrought products—but a weld is a casting, and after the unit is given an Alumilite finish, the difference in color is often quite glaring. The remedy consists in applying a coarse ground finish to the weld, which makes the difference less noticeable than when the pieces are buffed. In some cases, of course, even this procedure is not satisfactory, and some other method of joining must be devised.

An oxide coating which deserves mention here because of the prominence into which it has bounded in recent years is that which is applied to Alzak aluminum reflectors. These reflectors are characterized by a combination of permanence and high reflectivity which was difficult to obtain by the older methods of finishing aluminum reflectors. The coating provides the surface protection, and the high reflection factors are the result of a special electrolytic treatment of suitable sheet just before the application of the coating.

Alzak reflector coatings have reflection efficiencies of from 82 to 85 per cent for the specular finish, and 75 to 80 per cent for the diffuse finish. Highly specular surfaces are produced by polishing; diffuse or matte surfaces are effected by etching, and it

Fig. 4—A number of aluminum novelties which have been colored by the Alumilite process. The illustration shows a gasoline pump dial, a motorboat dashboard, cigaret tray, a car handle, a cigarette case, a match box, a razor, a watch case, rings, keys, and a bracelet.

is possible to obtain gradations or surface between the two extremes.

The hard, glass-like coating maintains the high efficiency of Alzak reflectors under severe conditions of temperature and exposure. In addition, it permits cleaning methods not suitable for untreated aluminum reflectors. Soap and water will remove normal accumulation of dirt. For extraordinary cases, a mild abrasive, such as Bon Ami, can be used to restore the brilliant finish.

Fairbanks-Morse Bulletin No. 1600. This bulletin, issued by Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill., describes that company's line of polyphase wound-rotor or slip-ring, ball-bearing, induction motors.

The high starting torque and low starting current characteristics of these wound-rotor motors make them ideally suited to applications where the relatively high starting current of squirrel cage motors would be objectionable—in driving high-inertia, slow-starting loads, or where the size of motor required is relatively large with respect to the power supply.

Slip-ring or wound-rotor motors can be operated at either constant or regulated varying speeds, a feature that qualifies them for certain types of service for which squirrel cage induction motors are not suited. With proper regulating control, the speed can be varied between half and normal with load connected. Copy free upon request.

Better Maintenance of Metal, Concrete, Wood, Glass and Composition Surfaces is the subject of a 16-page catalog which is now being distributed by The Skybryte Co., Cleveland, Ohio. The catalog discusses the modern meaning of maintenance and the relation of commercial housekeeping — cleanliness— to maintenance. The text is devoted to descriptions and discussions of the various kinds of wall finishes made by this firm with explanations of the problems presented by the different types of walls and the manner in which these problems can be solved. Photographs of the different kinds of walls or equipment are included to clarify the text. Among the different finishes discussed are Skyco Mill-Bryte, Skyco Wall-Bryte, Skyco General-Purpose Aluminum Paint, de luxe aluminum enamel, heat resisting aluminum paint, acid and alkali resisting aluminum paint, heat resisting black paint, acid and alkali resisting black paint, non-bleeding caulking compound, concrete and masonry paint, "Rust-Tox", factory glass cleaner, quick-acting rust solvent, Skyco No-Glare Window Coating, concrete floor enamel, and seal-tread varnish.

An outstanding feature of this book is the Skybryte Handy Application Index on the inside back cover. This chart lists down one side the various types and kinds of surfaces and across the top, the different conditions with which the surfaces can be surrounded, such as moisture, high heat, acid, and so on. At any point where the vertical and horizontal lines meet, indicating the type of surface and conditions surrounding that surface, will be found the name of the surfacing material designed to meet that problem and the number of the page upon which complete details regarding this surfacing material will be found.

Copy free to any mechanical executive upon request.

Cameron Motorpumps. Ingersoll-Rand Company, 11 Broadway, New York, N. Y., has issued a new catalog describing its Cameron Motorpumps. These pumps are compact machines combining electric motor and centrifugal pumps in a single unit. Capacities range from 5 to 1000 gallons per min. for heads to 500 ft. Motor sizes range from ¼ to 40 h.p. Copy free upon request.

Hamilton Mill Cut Rotary Files are described and illustrated in a folder which is now being distributed by The Hamilton Tool Co., 222 North B St., Hamilton, Ohio. The folder shows the different types and designs of mill cut rotary files and describes the specific uses and applications of the different kinds of files. The files are made in 22 standard shapes, numbered from 51 to 72. Each shape is obtainable in five standard cuts. Copy of the folder free upon request.

Baldwin-Duckworth Non-Corrosive and Heat Resistant Chains Bulletin 59. The machine finished power transmission chains and roller chains made by Baldwin-Duckworth Chain Corporation, Springfield, Mass., are described and illustrated in an eight-page folder which is now being distributed by that firm. The bulletin includes a table showing the resistance of the stainless steel used in these chains to various types of corroding agents. Specifications and prices are included. Copy free upon request.

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Barrel Burnishing of Metal Products

Fifth Article of Series — Barrel Burnishing Defined.

By H. Leroy Beaver

THE process of producing a burnished or polished surface on various ferrous and non-ferrous metal products by subjecting them to pressure while revolving within a mass of steel or some other burnishing materials has been defined in so many ways that to the lay mind the whole subject has become vastly confusing. At various times the operation has been termed Rumbling, Tumbling, Tubbing, Ball Rolling, Barrel Rolling, Ball Burnishing and Barrel Burnishing. To us the latter name seems to be the most applicable to the process. If we are ever to have clarity we must discard these names that are confusing and adopt some one name that will distinguish this particular operation from other operations that are or may be accomplished in a revolving barrel.

The term Rumbling when applied to burnishing is of course a misnomer for this operation denotes a rough type of barrel in which castings are operated for the purpose of smoothing and removing scale from the surface and for loosening and shaking out core material.

The term Tumbling denotes a somewhat similar operation and its proper applicability is in cases where a revolving barrel process is used principally for the removal of burrs and more particularly from stampings and for smoothing small castings, and which may best be accomplished by the use of either soft annealed burnishing materials or various combinations of abrasives either natural or artificial, usually in unlined cast iron barrels. The term Tumbling is also applicable to the various operations as carried out in what is known as Oblique Tilting Type Tumbling Machines, used not only for cutting down work, but for sawdust drying, japanning, and so on.

Ball Rolling and Barrel Rolling are terms that have crept into the nomenclature within the past few years, and their applicability to the process is difficult to comprehend. Ball Rolling would seem to indicate that the parts placed in a revolving barrel are polished or burnished by the action of the burnishing balls rolling over the surface, which we might suggest is an action impossible of mechanical accomplishment. Balls or other metallic burnishing shapes cannot roll over the surface of articles because the burnishing operation itself is not accomplished on the surface of the inclined plane of the flowing burnishing mass, but deep within the mass where it would be impossible for a ball to roll.

Barrel Rolling is equally a misnomer for the reason that the mass does not roll but rather flows. May we explain this "flow" in this way. When the barrel is loaded with burnishing material and work and ready for operation we may assume that

the mass lies on a horizontal plane across the barrel. Now when the barrel is put into operation the action of the centrifugal force carries the mass from a horizontal plane up the side of the periphery of the barrel to an inclined plane of, let us say 45 degrees. Thus we have the mass of burnishing material and parts on a distinct inclined plane. As the mass reaches its highest point, provided the proper barrel speed is used, the mass does not spill over at the top of the inclined plane but flows in a distinctive and readily recognized curve, which for want of a more expressive description could be termed "kidney shaped", for the flow is not in a straight line but sags as the mass passes over the center of the axis of the barrel and then again rises perceptibly at the bottom of the inclined plane. From this point, the mass idles more or less with the speed of the barrel until it passes a line drawn directly through the center of the axis of the barrel to the bottom of the barrel, and from this point it begins its upward climb to the top of the inclined plane of the burnishing mass, and it is within this area from the center of the bottom of the barrel to the top of the inclined plane of the mass where the burnishing action, or in reality, the "work hardening" process is actually accomplished. Now the inclined plane of the mass would naturally have a "rubble" surface over which a ball or other burnishing shape could not roll, and even if it did it could accomplish no burnishing action for the good and sufficient reason that no pressure would be present, and pressure is absolutely essential if any burnishing result is to be secured.

Research to us is much like a drive down an unfamiliar road in the countryside. You find interesting by-paths which tempt you aside, and what was first thought of as a "little journey" develops into a long time exploration from which we gain valuable and often unsuspected facts. Perhaps in studying the barrel burnishing of metal products we should more aptly liken the research to a jig saw puzzle. We are trying to gather together the complete picture. At one place we put together a few connected facts on steel burnishing materials. In another corner we fit in more facts relating to soaps and lubricants. In another operating speeds. In still another facts relating to loading and unloading the barrel. From the meagre picture we are able to draw after upwards of twenty-five years of continuous study we do not hesitate to predict that it will be generations before all of the gaps are filled in and the puzzle all put together. The problem has more facets than a finely cut diamond, and it is utterly inconceivable that one mind will ever be able to encompass them all.

Barrel Burnishing Defined

Barrel Burnishing is a process for the polishing or burnishing of various kinds of metal products both before and after plating and to provide either a smooth surface and uniform color prior to plating or a brilliant or limpid finish after plating. The process simply described consists of subjecting the parts to be burnished to rotation within a burnishing medium and producing this rotation while the parts to be burnished are suspended in the burnishing mass.

This means the parts to be burnished are actually rotated within the burnishing mass, while suspended within that mass, that is to say, the parts are not substantially displaced radially from approximately the central position. In other words the parts are rotated while continuously held approximately central of the burnishing mass, and excludes a con-

dition where the parts being burnished are sometimes within and sometimes without the mass. (This latter would be simply "tumbling").

Barrel Burnishing is a process and not a piece of mechanical equipment. For carrying out the process an apparatus is required consisting preferably of a polygonal drum or barrel, which is subjected to rotation by some driving mechanism, the drum or barrel in turn subjecting the burnishing mass therein to rotation, and the burnishing mass subjecting the parts to be burnished within it to rotation.

Four elements enter into the process, (1) the speed of the barrel, (2) the speed of rotation of the burnishing mass relative to the size and shape of the articles being burnished, the movement of the mass being such as to effect only a slow and restrained displacement along the surfaces of the parts being burnished and so as not to dislodge them radially during rotation, (3) the relative specific gravity of the burnishing mass and of the parts to be burnished, a relation always present, and (4) the relative quantity of the burnishing mass proportioned to the size and shape of the parts to be burnished.

Examining these elements we come first to the speed of rotation of the burnishing barrel. With half a dozen catalogs of barrel manufacturers before us we find no two in agreement as to speed of a given size of barrel. One says 30 r.p.m, another 42 r.p.m. and a third 50 r.p.m. Is the purchaser of a barrel, provided he gains his information from a catalog to assume that because a manufacturer specifies a given speed, that his barrel must operate at that speed? We are absolutely convinced to the contrary. There is no question but that the speed of the barrel is a very important element to be considered. If, for instance, your catalog specifies that the barrel you are using should operate at 45 r.p.m., you are probably operating it at just that speed on all types and sizes of parts you burnish, and if you are following this practice, then we can assure you that the chances are you are not getting the results you should have. Most machine tools in this day and age are fitted with variable speed gears or step up pulleys, and a burnishing barrel, being a machine tool too, and an important one, should have a driving mechanism so arranged that it too could be operated at variable speeds depending on the shape, size and character of the parts to be burnished.

Now as to the speed or rate of flow of the burnishing mass, relative to the size and shape of the parts to be burnished. You will understand that in order to carry out the Barrel Burnishing Process the entire mass of burnishing materials and parts must rotate around the center of the axis of the barrel. Naturally this rotation cannot be secured unless the volume of the mass fills the barrel from ⅔ to ¾ full. This having been done the speed of the barrel must be regulated so that the mass flows freely, but restrained to the point that the parts to be burnished are not thrown out of the mass by too rapid rotation of the barrel. Barrel speed is largely dictated by the size and shape of the parts to be burnished. The general rule is that, the more regular in shape the parts the greater the speed of the barrel and as parts tend to draw away from regularity to irregularity, a corresponding lowering of the speed of rotation of the barrel must be exercised. To the experienced barrel operator, and by this we mean one who has had experience in the operation of various types and sizes of barrels, there comes a knowledge of

barrel operating speeds that our command of English leaves us in a difficult position to describe. Having stood beside hundreds of barrels of every conceivable size and type over a period of upwards of twenty-five years there seems to have come to us a sense of proper operating speed. There is a rhythmic cadence in the sound of the mass revolving within the barrel that somehow enables one to sense whether the speed is too fast or too slow or just right.

The reason why burnishing barrels are made in six, nine, twelve and sixteen sided models is to enable them to carry the burnishing mass up the side of the barrel so that it can flow over and across the center of the axis of the barrel. Even in these irregular shaped barrels the downward gravitational pull against the centrifugal force allows a certain amount of slippage of the mass backwards toward the center of the bottom of the barrel. We have often been asked why just ordinary round, smooth sided barrels would not be satisfactory for barrel burnishing and the answer is of course, that there would be too much slippage of the mass and at certain speeds the mass would move very little and the outer barrel or shell simply slide around it.

Now as to the relation of the specific gravity of the burnishing material to specific gravity of the parts to be burnished, which is our third element to be considered, let us take two articles widely apart in characteristics and we can best illustrate this by a composition billiard ball for the one extreme and a steel ball for the other, both the billiard ball and the steel ball being of the same diameter, that is, 2¼ inches. The barrel for our demonstration being of the regulation polygonal form, 17 inches in diameter and 24 inches long, having plate glass ends, so that the action within the barrel might be observed, and carrying a load of 480 pounds of steel burnishing materials slightly more than ⅔ filling the barrel. On the initial test the barrel was operated at 10 r.p.m. giving a peripheral speed of 23.6 feet per minute and in the second test at 18 r.p.m. with a peripheral speed of 58.6 feet per minute. The specific gravity of the burnishing material mass was 4.9, that of the billiard ball 1.7 and of the steel ball 7.8. You will note that the specific gravity of the billiard ball was materially less and of the steel ball materially more than that of the burnishing mass itself.

In both tests and at both speeds the billiard ball and the steel ball were placed in the same relative position deep within the burnishing mass. Observing the operation, it was noted that the billiard ball was immediately carried up to the surface of the mass and then slid down the inclined plane of the mass to the side of the barrel where it floated on the surface of the burnishing mass. The steel ball however continued to rotate within the mass, at no time coming to the surface, but being continuously under pressure within the burnishing mass.

If the relation of specific gravity of the parts to be burnished to that of the burnishing mass had no bearing on the subject, then the lighter billiard ball would have maintained the same relative position within the burnishing mass as the steel ball, since they were both spheres, were both placed in the same relative position and operated upon in the same way. The theory therefore, of the relation of specific gravity of the parts being burnished and of the burnishing mass, is a demonstrated scientific fact.

A burnishing mass though mobile, is not liquid. It exerts great pressure both when at rest and when in motion. When at rest, it is difficult to force ones hand through the mass

to the bottom of the barrel. Now the mass not being liquid, the billiard ball and like articles whose specific gravity is materially less than that of the burnishing mass, do not float or burst to the surface by reason of any buoyancy, but are impelled to the surface by a force produced within the mass itself during rotation.

There are many forces operating on the parts within the burnishing mass, which at a given instant, in mechanical parlance, are all resolved into one final or resultant force. It is this force, the resultant of all the forces, which impels the parts of lesser specific gravity to the surface of the burnishing mass, and they are never again able to regain a position within the burnishing mass. Such parts are unable to resist this force because of insufficient inertia. If they had greater specific gravity, hence greater inertia, they would correspondingly better be able to resist the resultant force. Articles of greater specific gravity than that of the burnishing mass are able to resist the force and hence to retain their position within the burnishing mass. Hence it is the specific gravity of the parts to be burnished, or to put it in another way, the inertia of the parts is a distinct factor in their resistance to the force trying to dislodge them.

Now let us take for example this 2¼ inch steel ball weighing 1.676 pounds. The resultant force to which we have referred is a force which would produce on this ball a motion of rotation of the ball about its axis and also a motion of translation or dislodgement. This is because the resultant force so operating on the ball does not pass through the center of gravity of the ball. If it did only one motion would be produced, that is, translation of dislodgement in line with the direction of the resultant force.

We find too, that in following out these conclusions that any article of approximately perfect sphericity is better able to withstand the force of dislodgement than any irregularly shaped piece. This is more readily appreciated when it is considered that the stream of burnishing mass, acting upon projections or irregular portions of the parts being burnished, is inclined to throw them out of position, while in the case of a perfect sphere no such irregularities are presented; but perfect symmetry alone will not enable the parts to remain within the burnishing mass. This is amply demonstrated by the test on the lighter specific gravity billiard ball, which, due to insufficient inertia or specific gravity, was forced entirely out of the burnishing mass by the resultant force.

There are certain exceptions that may be noted. We have found that in the case of hollow shells of various metals, that, when placed in the barrel they are immediately filled with the burnishing mass, hence the specific gravity of such shells is not the specific gravity of the shell alone but the resultant of the specific gravity of the shell and of the mass within the shell. This resultant specific gravity being greater than that of the burnishing mass in a material and not in a trifling degree contributes substantially to keeping such articles within the mass during rotation.

The extent of the resistance of the inertia of the parts to the resultant force of dislodgement is one of degree, dependent on the extent of the force and the inertia. Even a slight addition to the inertia of a part may suffice to sway the result in favor of the part as against the resultant force and thereby retain it within the mass.

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Three barrel manufacturers have asked the writer why they had difficulty in burnishing parts or stampings made from aluminum. One thought that aluminum had a "greasy" feel—another that the steel burnishing mass would not "take hold" on the aluminum and a third had no theory on the problem at all. The answer lies in the variation of the specific gravity of the steel burnishing mass which is approximately 4.9 and the specific gravity of the aluminum parts approximately 2.70, and the aluminum parts having been forced out of the burnishing mass by the action of the resultant force, could not again re-enter the mass, but floated on top receiving little or no pressure from the mass, hence no burnishing action.

All of the above brings us back to the character of the material composing the burnishing mass. There can be no adequate burnishing result without the resultant force of the pressure of the mass against the parts being burnished. A true sphere offers the least resistance, an irregular burnishing piece offers substantially greater resistance, hence its greater efficiency for barrel burnishing application.

We have been asked for a formula for computing or analyzing the stress of a flowing burnishing mass containing many forces combining to form the final or resultant force. Very frankly we cannot tell you. Weeks of laborious calculations might be involved and even when completed its accuracy would be dependent on certain assumptions which well may have been erroneous in the first instance. It will be recognized as a pretty difficult thing to develop a formula when we must start by assuming a thing to be a fact. Our human assumptions are generally too frail to be used as a basis on which to establish a foundation of fact.

Returning to the question of speed of operation of the barrel, may we suggest that as between perfect spheres and irregularly shaped parts we have, on account of the symmetry of the sphere a very different system of the combination of forces and impulses from what we would have acting in the case of more irregularly shaped parts. As the parts range away from the basis of the true sphere toward irregular shapes, an adjustment or control of the speed of the barrel must be exercised commensurate with the remoteness of the part from the true sphere. In other words, the more irregular the part, the more need for control or adjustment of the speed of the barrel. For example, an operator may have a wide variety of parts or shapes to burnish, and if he does not have burnishing equipment that enables him to vary his barrel speeds, it is safest for him to regulate the speed of his barrel, in order to avoid continual change of line pulleys, to the speed at which the most irregular and difficult of the pieces are best operated upon, and this will generally be a comparatively low speed which will not dislodge the parts from the burnishing mass. This low speed would be the one adopted for the more difficult parts having a size and shape requiring a lower speed than the others. Other articles in the group could be burnished at higher speeds, but the comparatively lower speed having been adopted for the more difficult parts, will be equally effective in the burnishing of the complete group.

In the early days of what was then called Barrel Burnishing, and as late as 1910 most of the parts operated in barrels were very small articles such as collar buttons, studs, corset parts, loops, thimbles, and so on.

These articles in great quantities, hundreds and even thousands at a time were dumped into a barrel, which was indiscriminately filled with these small parts and usually a heterogeneous mixture of balls, punchings, and whatever might be found at hand that would produce a burnishing mass. Then the whole was tumbled about at great speed, some of the barrels having oscillating motions to provide even greater agitation and throwing about of the entire mass. In American Machinist of April 1910, we quote a writer on the subject as follows:

"The process consists of placing the work in a tumbling barrel, preferably of wood and of the horizontal type, so as to prevent scratching of the work against the sides of the barrel and then **dumping** into the barrel a large quantity of small steel balls measuring in bulk about twice that of the work to be burnished together with a soap mixture in which the work and balls are confined or held together so that as the barrel rotates **the whole mass of soap, work and balls is tumbled about causing the balls to be forced in all directions** across all of the work surfaces thus giving a constant burnishing action."

What a contrast to the form of procedure then and what we now know or should know of barrel burnishing practice. At that time it was thought that a violent churning about of the entire burnishing mass produced the finish, but now by eliminating one phase after another we learn that it is the pressure within the burnishing mass that produces the ultimate burnishing result, and not the violent tossing about of the entire mass.

The proportion of burnishing material to parts to be burnished is a phase of the subject that has always been open to argument. The generally followed method is to use two parts of burnishing material to one part of the parts to be burnished, measured by volume, not by weight. We would concede this formula to be satisfactory on small regular parts, but would suggest that as the parts increase in size or irregularity of form that a correspondingly larger proportion of burnishing material is required. In any application of barrel burnishing the safe rule is to always see to it that the parts are completely enveloped or cushioned within the burnishing mass.

As we review the application of terms it seems to be understood to some extent that Rumbling and Tumbling indicate the removal of a part of the surface and that **Barrel Burnishing does not remove any of the surface of the parts being burnished.** This latter statement has been questioned by so many by way of answer we explain that the pressure exerted within a burnishing mass is so great that the Barrel Burnishing operation has a tendency to "work harden" the parts being burnished and this is especially true on non-ferrous parts and cases are not unusual where parts are reduced easily from .00025" to .00035" in thickness, but with no appreciable change in weight. If a barrel operator will take a vernier micrometer reading of the thickness of a part both before and after operation in the barrel he will undoubtedly find the part reduced in thickness but the weight will be the same. By the Barrel Burnishing Process we tend to give the parts we burnish a greater density, thus providing a more satisfactory surface for the later deposit of metallic coatings, lacquer or enamel.

NOTE: There are so many phases of the subject of Barrel Finishing of Metal Products, both before and after

plating, of cutting down operations, deburring, drying after burnishing, sawdust tumbling, and kindred operations, none of which would warrant a complete paper, that a series like this could go on indefinitely. It is our wish to discuss those phases that would be of most interest to the readers of PRODUCTS FINISHING. Will you therefore, send in your suggestions to PRODUCTS FINISHING as to the phase of Barrel Burnishing you would like to have discussed and in future papers we will take up those subjects of interest to the greatest number of readers.

General Electric Temperature Relays Type ICT-Self-Reset. The Type ICT temperature relays used to protect alternating current machines and transformers against overheating due to continued excessive load is described in a 4-page folder designated as GEA-2525 which is being issued by General Electric Company, Schenectady, N. Y. The ICT temperature relay disconnects the apparatus from the line at a predetermined temperature and reconnects it at a lower temperature. If desired, they can be used to give an alarm instead of disconnecting the apparatus. One relay is sufficient for machine or transformer protection, as it can be operated from the hottest temperature detector coil.

These relays are recommended for protection of all automatic station synchronous or induction machines and power transformers where temperature detector coils are installed. They can be also used in attended stations. Copy of folder GEA-2525 sent free upon request.

Fairbanks-Morse Bulletin 5814F. This bulletin describes that company's Ball Bearing Centrifugal Pumps, which have been especially designed to fully satisfy the exacting requirements of, and have been approved by, the National Board of Fire Underwriters and the Associated Factory Mutual Fire Insurance Companies.

Correct design, high-grade materials and precision manufacturing methods have made of F-M Centrifugal Fire Pumps highly efficient units, instantly ready to operate at full capacity and pressure. They provide a steady, non-pulsating flow with uniform pressures, and at shut-off or maximum pressures can operate against a closed valve without damage to pump mechanism or connecting pipe.

The pumps are offered with electric motor, gasoline engine, steam turbine, dual motor and engine, and dual motor and turbine drives. Copy of the bulletin free by addressing Fairbanks-Morse & Co., 910 S. Wabash Ave., Chicago, Illinois.

Tolhurst Metal Dryer Folder. The Tolhurst Countershaft-driven Centrifugal Metal Dryer is described in the 4-page folder now being issued by the Tolhurst Centrifugal Division of American Machine & Metals, Inc., 100 Sixth Ave., New York, N. Y. Tolhurst Metal Dryers apply a purely mechanical method of drying metal parts, that of centrifugal force. The general design of the dryer presents several important features. The outer casing is bolted rigidly to the floor. The removable basket sets into a fixed basket which is mounted directly on the spindle. The removable basket is readily inserted and withdrawn from the fixed basket and is easily dumped. The metal dryer may be furnished with attached countershaft, with a clutch pulley for belt drive with horizontal motor, or attached vertical motor drive. Tolhurst Centrifugal Metal Dryers can be constructed to meet special drying requirements. A copy of Tolhurst Metal Dryer Folder free upon request.

Leeds & Northrup Catalog EN-96. This 32-page catalog describing apparatus for hydrogen-ion concentration measurements in laboratory and plant has just been issued by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa. The catalog describes and lists the latest forms of L&N electrodes, potentiometers, a potentiometer-electrometer and galvanometers for determining the pH of aqueous solutions for research and analytical purposes in the laboratory and for process control in the plant. For the latter purpose, equipment is provided for spot tests, and for continuous recorded measurement, which, in the case of certain specific processes, leads to continuous recorded measurement with automatic control. Data on applications, limitations, useful ranges, limits of error, potentials, and so on, simplify the selection of electrodes, potentiometers and galvanometers required. As a consequence, there should be no difficulty in choosing the most suitable equipment for any proposed application. A copy of Catalog EN-96 will be sent free upon request.

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Pro-Fin-6

Armco Launches Paint-grip Process

By Edgar Schellenbach
The American Rolling Mill Company, Middletown, Ohio

SEVERAL months ago, research fathered a new product that solves an old problem in metal finishing.

Metallurgists of The American Rolling Mill Company, Middletown, Ohio, in cooperation with technicians of The Parker Rust-Proof Company, Detroit, bared a century-old secret: They discovered a process that makes paint "stick" to a galvanized surface without acid-etching or weathering. This newest product of Armco appropriately has been christened "Paint-grip".

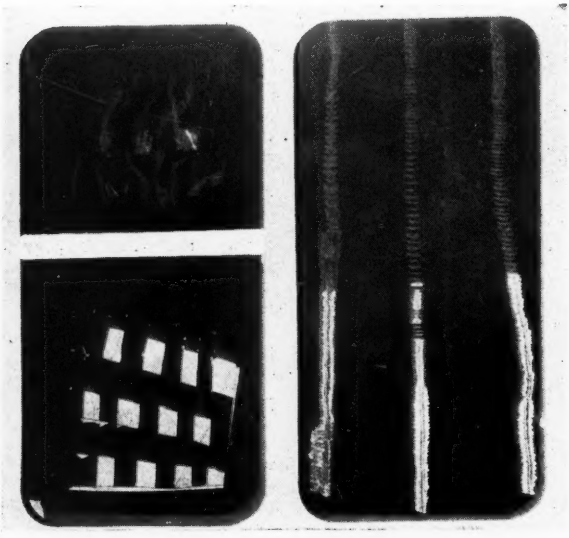


Fig. 1—The upper portions of these two sample sheets have been treated with Armco Galvanized Paintgrip; the lower portions have an ordinary galvanized coating. After paint was applied to the test panel on the left, criss-cross lines were cut with a pen knife in both sections. On the plain galvanized section, the paint could be lifted out cleanly with a knife; on the Paintgrip, the same pressure on the knife created only a slight smudge. The test panel on the left resists a piece of sharp steel whereas paint on the ordinary galvanized portion chips easily to the same pressure.

To determine the significance of the development it is necessary to weigh the reasons why a zinc coating is applied to iron and steel that is designed for certain uses. Plain galvanized iron and steel have served mankind—and served it well—for more than a hundred years. The real value of this shiny, silvery-tinged surface coating lies in its tendency to sacrifice itself to protect the base metal underneath. There is every likelihood it will continue in wide use for many kinds of products where immediate painting is not a prime essential.

What, then, prompted metallurgists to perfect this new coating that permits galvanized

metal to take paint evenly and hold it as long as the paint itself lasts?

The primary reasons were two-fold. Immediate painting of galvanized sheets is the first step toward longer life of the metal; and second, the necessity for painting became acute because of a definite swing toward color in many kinds of manufactured articles within the last decade.

New merchandising methods were dictated by a public that had become color-conscious. Tremendous advances in dye or (color) chemistry gave manufacturers an opportunity to put figurative Easter bonnets on their products. In recent years, practically everything sold has been dressed up in tasteful color harmony. It has been estimated that since the World War, more than 200,000 products have been influenced by advancements in the chemical industry. Yet, through the years, in any product that contained galvanized metal, this bright, spangled coating generally was conspicuous by its lack of color uniformity with the balance of the materials.

Little wonder that the business man's unsatisfied thirst for improvements tended to emphasize these heretofore minor shortcomings of plain galvanized iron and steel.

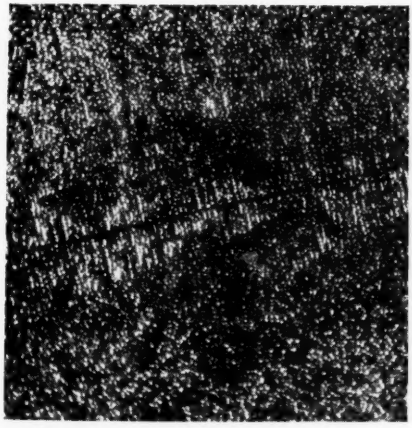


Fig. 2—Photomicrograph of an ordinary galvanized sheet, 40 diameters.

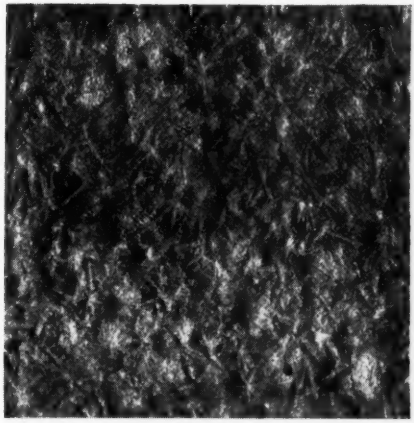


Fig. 3—Photomicrograph of a galvanized Paintgrip sheet, 40 diameters. The Paintgripping qualities of this sheet are made evident by the enlargement.

Now, what is galvanizing?

When Melouin announced the first tests of the hot-dip galvanizing process in 1741, he gave to the world of metals one of its most desirable finishes. But it was not until 1836 that metallurgists perfected essentially the same hot-dipping method as is used today.

Galvanizing by this process consists of cleaning the surface of the metal by pickling in a sulphuric acid solution, then after a thorough washing by passing it through a flux of molten ammonium chloride and finally immersing it in a bath of molten zinc until the iron or steel reaches the temperature of the bath. When the metal is withdrawn, it has an adherent coating of zinc.

Thus the chief reason for this process is to provide the base metal with protection from corrosion. Of the metallic coatings, zinc is considered

Fig. 4—Truck bodies made of Paintgrip sheets have a smooth surface on the curved parts.

best for general rustproofing because its tendency to be oxidized is greater than that of iron or steel. For long ago, it was found that zinc is the only one of the commonly used metals that is electro-negative* to iron.

But, a galvanized surface lacking paint or the qualities to absorb paint presents a problem that is perhaps more serious than the lack of color in the finished products. Zinc, and the compounds ordinarily present on zinc surfaces, dry out the essential oils in the paint which are necessary to give it "life". Consequently, the paint cracks and peels and results in unsightly products.

In spite of all this, due to its protective powers zinc remains the best metallic coating for iron and steel. Those manufacturers who find galvanized metal indispensable to their products leave the customer with three alternatives, so far as painting the surface is concerned.

First, the consumer can sit back and permit nature to take its course; second he can etch the surface with acid before painting; or third, he can permit the sheets to weather before applying paints.

It can be seen that whatever method is chosen, a part of the zinc coating **ultimately is removed.** And with its removal goes the very purpose of galvanizing — protection for the metal beneath.

Armco Paintgrip sheets solve this problem and meet three vital requirements: 1. An iron or steel sheet that retains a full-weight, pure zinc coating; 2. Good physical surface for mechanical adhesion; 3. A superficial insulating coating that is chemically neutral and retards ageing and failure of the paint.

The Paintgrip sheet is chemically treated to produce a finely crystalline phosphate coating which is neither acid nor alkaline, and keeps the paint from direct contact with the zinc surface. This coating is an integral part of the sheet and is slightly granular in nature.

Forming qualities of Paintgrip sheets are the same as untreated galvanized sheets having corresponding weights of coating. They may be soldered satisfactorily with the use of hydrochloric acid as a flux. So-

* **American Electrochemical Society term.**

called "cut acid" is not strong enough to penetrate the Paintgrip film, which must be dissolved before a good solder bond can be obtained. It is necessary that the acid be washed off thoroughly after soldering.

In arc or gas welding, the fabricator will find the treatment required is the same as is used for untreated galvanized sheets. In spot welding, however, a higher voltage is necessary because the Paintgrip film is a non-conductor and acts as an insulator. Therefore the spot welder must have sufficient current capacity to complete a circuit through the film and coating.

While Paintgrip sheets shipped from the company's mills are prepared to receive paint without further treatment, handling and fabricating operations in customers' plants will often necessitate cleaning. Organic cleaners such as naphtha, benzine and lacquer thinners are preferred.

If alkaline cleaners are used, the Paintgrip surface will be attacked and partly removed by their action. Because of its crystalline absorbent nature, the surface of the sheet will tend to absorb a certain amount of the alkalies which are difficult to remove. Alkaline conditions under a coat of paint are considered one of the most common causes of early paint failure. In all cases, the sheets should be thoroughly dried before painting.

Practically any good paint system can be applied to Paintgrip sheets. If the final finish is to be a lacquer, it is recommended that a good oil-base primer be applied as the ground coat. Many paint manufacturers are now producing special primers which have considerable merit.

If baked finishes are used, the paint manufacturer usually recommends a suitable primer. Any good baking system will be found satisfactory for Paintgrip sheets, provided the baking temperature does not exceed 450 degrees Fahrenheit. Higher temperatures are apt to be detrimental, particularly if the time of baking exceeds 15 minutes.

Although Paintgrip has been produced for commercial purposes only during the last six months, this new kind of galvanized sheet already has a prominent place in the merchandising activities of many manufacturers who are utilizing the specially-coated metal for their products.

So far, the demand has centered on manufactured articles of many kinds. The market includes makers of commercial truck bodies, washing machines, refrigerators, metal furniture and equipment, cafeteria and dairy equipment, heating, cooling and air conditioning facilities, and roof drainage products.

Manufacturers of farm equipment

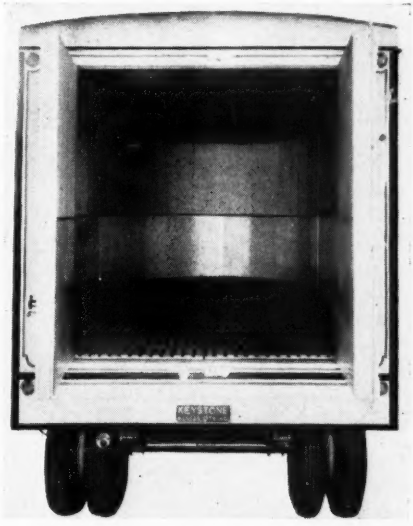


Fig. 5—Paintgrip finds ready application on the interiors as well as exteriors of truck bodies.

are using Paintgrip to achieve color combinations that heretofore had not been attempted. Manufacturers of poster panels, and embossed and flat signs find this new coating highly suitable for their products. The railroad and marine markets also are utilizing Paintgrip for various equipment.

Fig. 6—Illustration showing galvanized Paintgrip gutters and downspouts. The metal was painted at the time of installation.

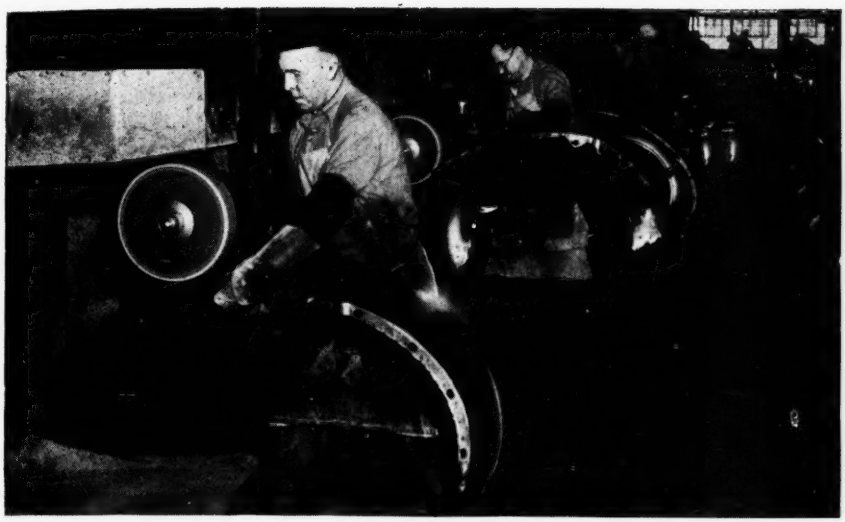
The construction industry, of course, will be one of the major outlets. Paintgrip has been found excellent for roofing, siding, metal awnings, cornices, metal tile, gutter, flashings, downspouts and other building accessories.

Fan Cooled Squirrel Cage Motors. A publication describing the new line of Type CS Squirrel-Cage Motors has recently been announced by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. These motors employ a new heat exchanger principle of cooling, self-cleaning ball bearings, tested insulation with taped end turns and corrosion resisting construction for general use indoor and outdoor where foreign matter would be harmful to the windings. Copies of the publication are available from the nearest district office or direct from Department 5-N, Westinghouse Electric & Manufacturing Co.

Alox Bulletin L-36. This bulletin being issued by the Alox Corporation, P. O. Box 556, Niagara Falls, N. Y., comprehensively discusses the merits of Alox Anti-Rust Compounds most applicable to specific types of corrosion. The method of furnishing certain proven formulae, ready for use, are discussed. Each formula is carefully tested by accelerated methods before recommending its use to the trade. The purpose of the bulletin is to announce a line of finished anti-rusts, and to point out relative merits of the various items.

The Alox Bases used in all products are derived fully from petroleum, and are non-toxic in nature. The solvent used is a derivative of petroleum, carefully chosen for its freedom from sulfur or sulfur compounds which are so often responsible for the staining of metal surfaces. It is an accepted safety solvent, but normal fire precautions taken with similar materials should be adhered to with anti-rust. A copy of Bulletin L-36 describing these Alox compounds will be sent free upon request.

Handy & Harman Bulletin No. 2. This bulletin describing precious metal refining facilities is now being issued by Handy & Harman, 82 Fulton St., New York, N. Y. The complete equipment of the precious metals refining department is illustrated and described in full detail. The work done in this department is said to be based on the same cost and profit basis as in the other manufacturing departments of Handy & Harman. The bulletin gives a clear idea of the care with which refining work is carried on. It should be of particular interest to those who cannot see the plant, the facilities, and the processes themselves. Copy free upon request.



Fender Polishing..

Another Job for Alundum Abrasive

FINISH is important on fenders—imperfections from the stamping operation and from handling must be carefully removed or they will be made more noticeable by the enameling.

Because Alundum Abrasive gives the desired finish and does it quickly, many automobile plants are finding it the most economical grain that they can use. Special Norton manufacturing processes assure: (1) uniform size, (2) strong shape, (3) high capillarity—three features that contribute greatly to the popularity of Alundum Abrasive.

NORTON COMPANY
WORCESTER, MASS.

G-51

NORTON ABRASIVES

the FINISHING FORUM

Question: I have experienced trouble in nickel and chromium plating small cast brass bars which have been soldered together to form a small angle. The nickel plate has a good appearance, but when the chromium is applied, the nickel blisters and peels off the brass around the soldered joint. I am using a zinc-hydrochloric acid soldering flux and I have found that the more free acid there is in the flux, the more trouble I experience in plating. What procedure would you recommend to overcome this difficulty?

Answer: There are two possible solutions to your problem. One cause of trouble is the trapping of acid in the soldered joint. The strains and stresses set up in the plate by the deposition of chromium loosen the plate over the soldered joint where trapped acid has prevented perfect adherence. This source of trouble can be minimized or eliminated either by keeping the free acid in the soldering flux at the lowest possible value, or by using a rosin-alcohol flux instead of the zinc-hydrochloric acid flux.

When brass, or soldered brass, is made the cathode in an alkaline cleaning bath, the lead, tin, and zinc in the soldered joint tend to dissolve in the solution and then plate out again around the joint in a non-adherent condition. This source of trouble can be eliminated by using a reversing switch on the cleaner tank so that the work can be made the anode for a few seconds after the principal cleaning has been done. Any non-adherent metallic particles will thus be plated off the work, leaving the surface chemically clean and active.

In view of the constant increase in the number of requests that are being received for information regarding various phases of metal finishing, we have decided to establish a department especially devoted to our readers' problems and the solutions of those problems. This department is to be conducted under the heading "The Finishing Forum".

We have been fortunate in obtaining the cooperation of outstanding authorities in the field of cleaning, plating, burnishing, lacquering, and so on, who will comprise our advisory staff. These consultants will be glad to answer any question or advise upon any problems that are submitted to this department by our readers. Simply address your letter to The Editor, PRODUCTS FINISHING, 431 Main St., Cincinnati, Ohio.

Question: When the flood water receded, there was left a rusty, muddy deposit on our cadmium plated work. This deposit is difficult to remove by tumbling, especially in the recessed parts of the work. Please tell me how this film may be removed.

Answer: Dip the defective work in a 1-5 per cent hydrochloric acid solution for a few seconds and rinse thoroughly in hot water. If the parts are too badly affected by the muddy film, they may have to be stripped in a solution of 1 pound per gallon of ammonius nitrate and replated.

Question: Please recommend a procedure for nickel plating lead articles.

I am having difficulty in securing a dense, adherent nickel deposit on this base metal.

Answer: When the adherence of a nickel deposit to a lead object is desired, clean the object in a mild alkaline cleaner and then immerse it for a few seconds in a solution composed of 1 gallon of water, one gallon of hydrochloric acid, and 16 oz. of nickel sulphate. The object to be plated should then be placed directly into the nickel plating bath without an intermediate rinse such as is usually employed.

Question: Recently we received some nickel plated iron parts to be chromium plated. The nickel plate had a good appearance, but when the chromium was applied, the nickel blistered and peeled off the base metal. Please discuss possible sources of trouble, their cure, and their prevention.

Answer: Several possible causes of peeling of a nickel deposit after the application of the final chromium finish are composition and structure of the base metal, composition, age, condition, and temperature of cleaner, amount of electric current used in cleaning (alkaline electrocleaner is presumed), improper pickling, improper rinsing, and films of grease on the surface of acid, rinse, or plating tanks or solutions.

If the base metal is steel, it should be easy to clean under ordinary conditions. However, if the base metal is cast iron, several factors may prevent proper adherence of the nickel coat. If the silicon content rises above 3.0 or 3.5 per cent the cast iron is difficult to clean and plate, due, presumably, to the formation of a complex silicate film on the iron to which nickel will not adhere. The structure of the iron is also important. An open, exceptionally porous structure makes cleaning very difficult. Either the cleaner is not strong enough to remove grease from the pores, or else the cleaner removes the grease and leaves small bubbles of hydrogen gas in the pores instead. The pickling acid may leave small bubbles of the gas in the pores also.

In either case the nickel will adhere to the iron until the chromium is applied and then rise up in small blisters. The correction in the silicon content must, of course, be made at the foundry. An iron possessing a very porous structure can be cleaned in a strong alkaline cleaner in which the work is made the cathode for about 2 minutes and then made the anode for a few seconds. The change in electric current in the cleaner tends to knock off any bubbles of hydrogen that would otherwise stay in the pores. Thorough rinsing in running water will remove gas bubbles formed in the pickling acid.

Most commercial cleaners will clean iron and steel parts efficiently if the solution is composed of 6 oz. per gallon of the cleaner. If the cleaner is controlled by chemical analysis, the total alkalinity should be above 2.0 oz. per gal. of equivalent sodium hydroxide. Cleaners containing rosin and insoluble matter should be avoided since these materials tend to form films on the work and, in the case of the insoluble material, actually plate out on the work and prepare the surface for subsequent blistering of the nickel deposit. The cleaner should also not be too alkaline since that condition tends to cause the formation of films on the work also. As an electrocleaner is used part of the caustic soda in the cleaner combines chemically with the grease on the work forming a soluble soap which dissolves in the cleaning solution.

Another part of the cleaner, called the emulsifier or emulsifying agent, removes mineral oils and greases from the work by forming a film around

the insoluble grease particles and thus dragging them mechanically from the surface of the work out into the solution. This grease which the emulsifier removes is known as the dirt load of the cleaner. The caustic soda that is lost through chemical combination with the grease can be replaced by adding more cleaner to the solution. However, when the dirt load becomes very great, further additions of cleaner to the solution will have very little effect, and the solution will lose its power to remove grease from metallic surfaces. The older a cleaner is, the more likely there will be trouble from an excessive dirt load. The only remedy is to dump the cleaner. Usually a cleaner is operated boiling or at a temperature near that so that the pores of the metal will be opened and cleaning facilitated.

When too much current is used in electrocleaning, a brown stain forms on the iron. This stain is very difficult to remove by scrubbing or by pickling and should be avoided by controlling the current used in the cleaner and also the time that the work is electrocleaned. A good cleaner for cleaning cast iron and steel has the following formula: trisodium phosphate 6 oz. per gal., soda ash 2 oz. per gal., caustic soda 1 oz. per gallon. This cleaner will operate well over a considerable period of time and show considerable less unit cost than most commercial cleaners.

When work is not dipped in acid for a sufficient time to remove any films left on the surface in cleaning, the nickel deposit will not adhere. Usually ½ minute in 5-10 per cent hydrochloric acid or slightly longer in 10 per cent sulphuric acid is sufficient to remove all films and prepare a chemically clean surface for the plating operation.

The remedy for improper rinsing or grease films on any of the solutions is obvious. Solutions should be clean and rinses should be equipped with running water or changed frequently. It is possible that small amounts of chromic acid may be present in the rinses, cleaners, or even in the plating solution itself. This will cause the plate to blister and peel just as was described. Cleanliness and careful control of all solutions are essential to the production of an adherent deposit.

(Answered by Ezra A. Blount)

American Nickeloid Round Edge Flat Wire Folder. This folder describing various applications of round edge flat wire is now being issued by the American Nickeloid Co., 28 Second St., Peru, Ill. It is stated that with round edge flat wire products can be "dressed up" without making expensive changes in fundamental designs and manufacturing routine. The steel base trim metals are also said to give new brilliance, price appeal and sales appeal to a multitude of items. The steel base, round edge flat wire forms, spot welds and solders very easily. Its brilliant finish cannot be marred or scratched in ordinary production routine. It is available in all standard widths and lengths in either bright or satin finish. A sample is enclosed with each copy of the folder. Copy free upon request.

Aluminum Paint Book. A 45-page book containing many interesting and attractive illustrations, along with a report of an outstanding development in aluminum paint and an outline of the requirements of different forms of maintenance painting—interior and exterior walls, ceilings, stacks, tanks, heated surfaces, and so on, is now being issued by Aluminum Industries, Inc., 2438 Beekman St., Cincinnati, Ohio. The proper type of Permite ready-mixed aluminum paint to use for each purpose is described and illustrated. An interesting chart showing the types and physical properties of Permite ready-mixed paint for applications such as oil length, viscosity, drying time, baking time, percentage of thinning required and so on is included.

Any maintenance or production executive will find considerable helpful painting data in this book. A copy of this book will be sent free and without obligation to any executive who writes on his letterhead to Aluminum Industries, Inc., 2438 Beekman St., Cincinnati, Ohio.

THE UDYLITE *Semi-Automatic* PLATING MACHINE

and what it will do for YOU

THE Udylite Semi-Automatic Plating Machine is a unit designed to produce better plated work at lower cost through close production control, elimination of rejects and labor saving.

The machine is a sturdy, durable unit built to operate continuously with a minimum of maintenance expense. In the construction are combined great strength and smooth, efficient operation.

A wide variety of sizes are available to handle any plating requirement. The Udylite engineer will be glad to investigate your plating problem and recommend the size best suited to your needs.

1. **Produces Uniform Deposits.** Just like "peas in a pod," every piece is uniformly plated as it is subjected to identical plating conditions.
2. **Provides Close Production Control.** YOU set the chain speed by manipulation of the chain regulator wheel. At ¾ or 5 feet per minute or any speed between, the chain conveyor delivers work to the unloading station.
3. **Saves Labor.** With the Udylite Semi-Automatic, two men can do the work of five or six with the ordinary still tanks.
4. **Chain Does the Walking.** The operator of the Semi-Automatic works in one spot loading and unloading the machine. Instead of walking to and fro, he simply loads the conveyor and the chain actually does the walking.

THE UDYLITE COMPANY

1651 E. Grand Blvd., Detroit, Mich.

New York	Chicago	Cleveland	San Francisco
30 E. 42nd Street	1943 Walnut Street	3756 Carnegie Ave.	114 Sansome Street

OFFICIAL PROGRAM OF AES ANNUAL CONVENTION

THE Twenty-fifth Annual Convention—the Silver Jubilee of the A. E. S.—will be held in New York City June 14, 15, 16, and 17, 1937 at the Hotel Pennsylvania, New York City, N. Y. This hotel is not only located in the heart of New York City, but also provides luxurious, comfortable and spacious living quarters.

The official program has been announced as follows:

Sunday Afternoon, June 13

2:00 P. M. Registration, Mezzanine Floor, Hotel Pennsylvania.

Registration fees: Men $9, Ladies $6, which entitles registrant to book of tickets to be used for all functions and activities.

Membership in Society is not necessary for registration.

Monday Morning, June 14

8:30 A. M. Registration, Mezzanine Floor, Hotel Pennsylvania.

9:00 A. M. Welcoming of Delegates, Members and Visitors. Franklyn J. Mac Stoker, General Chairman. Ralph J. Liguori, President, New York Branch.

Welcome to New York

Opening Session

Charles H. Proctor, Founder of A. E. S.

Presidential Address

E. Steen Thompson

Business Session

Presentation of credentials.

Submission of Amendments to Constitution.

Monday Afternoon, June 14

Papers start promptly on time.

1:30 P. M. Educational Session—Hotel Pennsylvania Ball Room. George B. Hogaboom, First President of the A. E. S., presiding.

1. Summary of Researches on Electrodeposition at the National Bureau of Standards. Dr. William Blum, U. S. Bureau of Standards.
2. Progress Report on Exposure Tests and Laboratory Tests of Plating on Non-Ferrous Metals. P. W. C. Strausser and Dr. W. Blum.
3. The Use of Color Photography in the Inspection of Exposure Tests of Plating. C. E. Vincent Davis and Dr. W. Blum.
4. A Magnetic Method for Measuring the Thickness of Nickel Coatings on Non-Ferrous Metals. A. Brenner, U. S. Bureau of Standards.
5. Experiences in Evaluating Plated Coatings. W. S. Pinner and L. B. Sperry, Detroit Branch.

Monday Evening, June 14

8:30 P. M. International Fellowship Club—Open House—Ball Room—Hotel Pennsylvania.

This night will be devoted to a party for men and ladies sponsored by The International Fellowship Club.

We look forward to the pleasure of entertaining you. We welcome

you as our guest. A ticket is included in the Book of Tickets which must be used for admittance to this affair. A night of entertainment, dancing, refreshments. For complete details see I. F. C. Folder enclosed with program.

Tuesday Morning, June 15

9:15 A. M. A tour of New York City in de luxe coaches of the Gray Line Motor Tours, Inc. A delightful trip through the Metropolis to points of known interest. Coaches leave promptly on time from Hotel Pennsylvania.

Tuesday Afternoon, June 15

2:00 P. M. An inspection tour of the modern S. S. Normandie, at anchor in New York Harbor. An opportunity to inspect one of the great ocean liners.

Tuesday Evening, June 15

Papers start promptly on time.

7:30 P. M. Educational Session—W. S. Barrows, third President, A. E. S., presiding.

1. A Discussion on Barrel Electroplating. Presented by Philadelphia Branch.
2. Electroplating in Europe and the First International Electrodeposition Conference. Walter R. Meyer, Electrochemist, General Electric Co., Bridgeport, Conn.
3. The Effect of Free Cyanide on the Cathode Efficiency of Silver Plating Solution. Messrs. Hirsh, Jackson, Snyder and Venelle of Philadelphia Branch.
4. The Prevention of Spotting Out. A Review of Conditions Affecting the Occurence of Crystal and Stain Spotting and Methods for Their Prevention. Gustave Klinkenstein, vice-president and technical director, Maas & Waldstein Company.

Wednesday Morning, June 16

Papers start promptly on time.

9:00 A. M. Educational Session—John E. Sterling, New York Branch, Past President of the A. E. S., presiding.

1. Health Hazards in the Plating Room, presented by Cleveland Branch.
2. The Cathode Efficiency of Electroplating Barrels and Its Effect on the Adhesion of Nickel Deposits. Albert Hirsch, Electroplater and Chemist, Carey McFall Company, Philadelphia, Pa.
3. A Resume of Silver Plating. F. C. Mesle, Electrochemist, Oneida, Ltd., Oneida, N. Y.
4. Simple Ideas that Worked. W. S. Barrows, foreman electroplater, Toronto Branch.
5. Mr. Leo Roon, Roxalin Flexible Lacquer Company. Title of paper changed. Will forward later.

Wednesday Afternoon, June 16

2:00 P. M. A guided tour of Radio City and NBC Studios, starting from the NBC Studios promptly at 2:00 P. M. This tour will take approximately three hours.

Wednesday Evening, June 16

Papers start promptly on time.

7:30 P. M. Educational Session—Horace Smith, Newark Branch, Past President of A. E. S., presiding.

1. Gold Electroplating. Presented by Newark Branch.
2. The Barrel Rolling of Metal Parts. Presented by Waterbury Branch.
3. Something New in Silver Plating. Donald Wood, Reed & Barton Company, Taunton, Mass.
4. Air Conditioning of the Plating Plant. Edward C. DeLorme of Boston Branch.

Thursday Morning, June 17

Papers start promptly on time.

9:00 A. M. Educational Session—Oscar E. Servis, Chicago Branch, Past President of A. E. S., presiding.

1. Brass Plating, as Practiced by Members of the Bridgeport Branch.
2. 101 Questions on Cyanide Copper Plating. Contributed by members of Rochester Branch, to be read by Frank J. Kohlmeier, foreman electroplater, Bausch & Lomb Optical Company, Rochester, N. Y.
3. The PH of Alkaline Plating Solutions. George B. Hogaboom, Hanson - Van Winkle - Munning Company.
4. The Manufacture of Rhodium Plating Solutions. Lionel Cinamon, ChE., Special Chemicals Corp., New York City. Member of New York Branch.

Thursday Afternoon, June 17

1:30 P. M. Final Business Session.
Discussion of Amendments.
Election of Officers.
Selection of Convention City.

Thursday Evening, June 17

7:30 P. M. Banquet and Dance. Hotel Pennsylvania Ball Room. Informal.

Entertainment: N. T. G. Master of Ceremonies and his Hollywood Revue.

PLATED WARE EXHIBIT

Attention is particularly directed to the exhibit of plated ware, submitted by Branches and individual foremen platers. This will be one of the outstanding features of the Convention, and worth anyone's interest and attention.

THREE GRAND PRIZES will be awarded the best exhibits shown.

PROGRAM FOR THE LADIES

Sunday, June 13

2:30 P. M. Registration and Reception.

Monday, June 14

Place—Hotel Pennsylvania.
Time—4 to 5 P. M.
Event—"Get Acquainted Hour".

Evening—Accompany the men as guests of the International Fellowship Club.

Tuesday, June 15

Morning—Accompanying the men on a tour of the Greater City to points of known interest.

Afternoon—Accompanying the men on an inspection tour of the modern ocean liner Normandie.

Evening—
Place—Paradise Cabaret Restaurant.
Time—6 P. M.
Events—Dinner, Dance, Revue.

Wednesday, June 16

Morning—See a Radio Broadcast.

Afternoon—Accompanying the men on a tour through Radio City.

Evening—(By courtesy of the International Fellowship Club).
Place—A New York Theatre.
Time—8:30 P. M.
Event—A current outstanding New York show.

Thursday, June 17

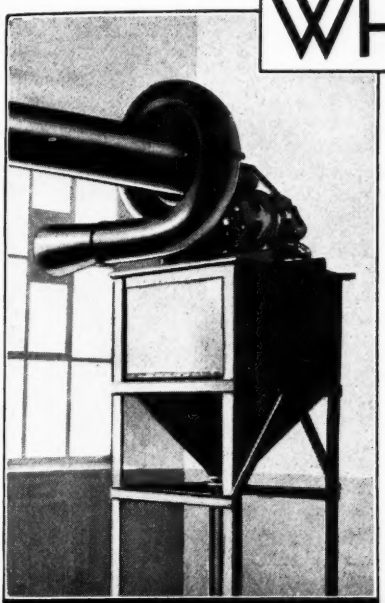
Morning—Open.

Afternoon—
Place—Hotel Pennsylvania.
Time—1 to 5 P. M.
Events—A Party with 20 magnificent Grand Prizes by courtesy of the International Fellowship Club.
Bridge and Card Party—Fortune Telling by the Narraganset Indian Princess Reba.
Refreshments—Prizes.

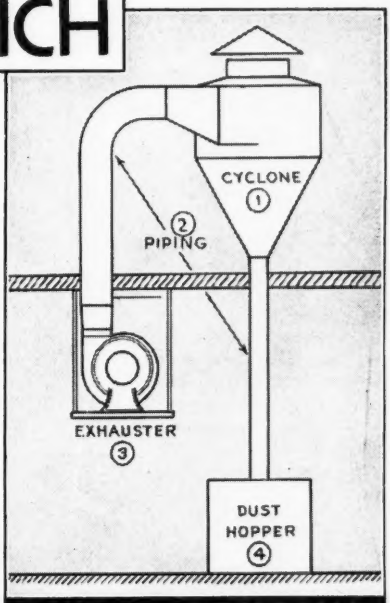
Evening—Accompanying the men to the Banquet.

Mention PRODUCTS FINISHING when writing to advertisers.

WHICH



THE SIMPLIFIED ROTO-CLONE WAY



THE EXPENSIVE OLD-FASHIONED WAY

ROTO-CLONE combines work of both blower and dust separator in a single unit, replacing the exhauster and cyclone separator ordinarily used for this service. ROTO-CLONE SAVES SPACE—it is no larger than an exhauster of the same capacity. ROTO-CLONE SAVES PIPING—it may be located at or near the source of the dust. ROTO-CLONE SAVES POWER—because its mechanical efficiency is higher than that of an exhauster and because it eliminates the cyclone.

But, even more important than ROTO-CLONE'S economy of space, installation, and operation is its higher efficiency in dust separation when compared to a cyclone or any other type of centrifugal separator. Write for Bulletin No. 270-H.

AMERICAN AIR FILTER COMPANY

343 Central Avenue **Louisville, Kentucky**

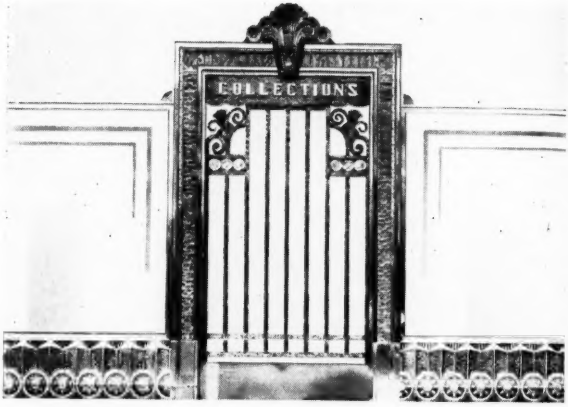
In Canada—Darling Brothers, Limited—Montreal, P. Q.

ROTO-CLONE

COMBINED EXHAUSTER & DUST SEPARATOR

FINISHES THAT AID IN APPEARANCE AND UTILITY

(Right) — Aluminum lends itself to many types of finishes as revealed by the teller's grille in the illustration herewith. Some of the metal has been hand-hammered to give an antique effect, while other parts of the grille, such as letters at the top, have been brightly polished.



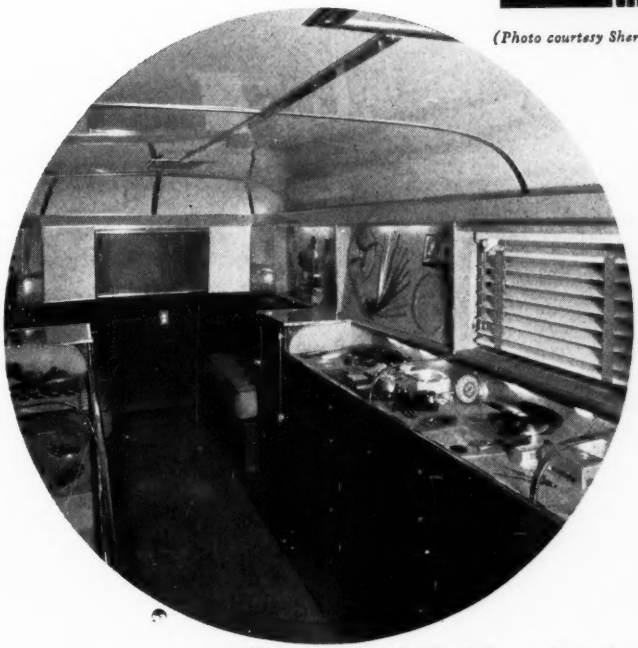
(Photo courtesy Aluminum Company of America)

(Photo courtesy Westinghouse Electric & Mfg. Co.)

(Left)—The platform surface and back splasher of this electric range are single pieces, covered with white porcelain enamel, thus eliminating all crevices in which food particles and dust can lodge.

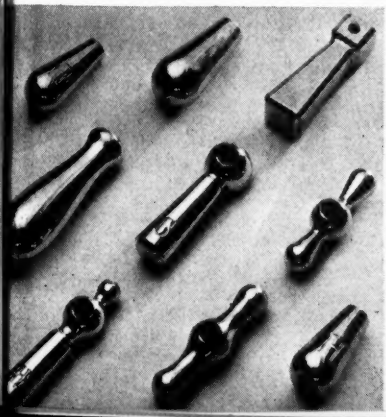
(Right)—Door chimes which emit a distinctive signal of harmonious tones that are pleasing to the critical ear are beautifully styled in art metal finish which is pleasing to the eye.

(Photo courtesy Sherwin-Williams)



(Photo courtesy Roxalin Flexible Lacquer Co., Inc.)

(Photo courtesy New Jersey Zinc Company)



(Above)—Interior of trailer finished in two shades of blue and aluminum. Articles on exhibit in the trailer are finished with materials which resist human perspiration, weathering, acids and alkalies, and withstand abrasion, blanking and forming.

(Left)—Although plastics and metal are in strong competition for handles, such as shown here, the proper use of color in the metal surface finish gives a strong argument in favor of the use of metal.

NEWS *of the* INDUSTRY

Roxalin Appoints Representatives

Fred Hurst, representative of Roxalin Flexible Lacquer Co., Inc., 814 Magnolia Ave., Elizabeth, N. J., has been appointed in charge of the Chicago area. He will be located at 5855 N. Mobile Ave., Chicago. Mr. Hurst is a practical finishing man, with a background of 16 years as a supervisor in the finishing departments of the Waterbury Mfg. Co.

Fred Hurst

Howard Verrault

and Volupte. Mr. Hurst moved to Chicago after a year of training in the Roxalin laboratory.

Howard Verrault is now representing the Roxalin Company in the upstate New York territory and is making his headquarters in Rochester, New York. Mr. Verrault has just recently completed a year of intensive training in the Roxalin laboratory.

Western Metal Congress and Western Metal Exposition

The Western Metal Congress and Western Metal Exposition under the auspices of the American Society for Metals is to be held in the Pan-Pacific Auditorium in Los Angeles, California, during the week of March 21-25, 1938. This will be the third Congress and Exposition to be held on the Pacific coast.

Twelve national societies and associations having branches in the West are arranging, as they have in the two previous congresses, to participate in the technical program which will have as its central theme, "Metals in Industry". The educational feature of this meeting will be most important and far-reaching.

The Pan-Pacific Auditorium in which the Congress and Exposition is to be held is a new exposition hall in Los Angeles, containing over 100,000 sq. ft. floor space. The Exposition will be a complete cycle of the metal industry, including raw materials, heat treating apparatus and supplies, inspection equipment, machinery, materials handling, small tools, and finished products.

The floor plans and contracts for space will be available about June 15, together with additional details.

Patterson Foundry & Machine Company Announces Opening of Pittsburgh Office

The Patterson Foundry & Machine Company, East Liverpool, Ohio, has announced the opening of its Pittsburgh office in the Bessemer Building, to be in charge of Mr. D. M. Wilhelm. Mr. Wilhelm was first connected with the Patterson Company in the production department and then in charge of sales at the New York office of the company. At the Pittsburgh office, an engineering department as well as a district purchasing department will be maintained.

U. S. Rubber Products, Inc. Announces Promotions

In keeping with its policy of promoting men within its ranks to fill executive positions, H. A. Everlien, sales manager, Mechanical Goods Division, United States Rubber Products Inc., announces that effective May 1 Mr. J. E. Power, manager of mechanical sales, would be promoted to assistant sales manager to be located at 1790 Broadway. Mr. Power has been with this company since 1906.

R. V. Hilands, manager of the Philadelphia and Baltimore districts, has been appointed manager of mechanical sales of the New York branch. Mr. Hilands has been with this company since 1913.

A. B. Means of the Philadelphia sales organization has been appointed manager of mechanical sales of the Philadelphia and Baltimore branches and R. F. Jackson of the Baltimore sales organization has been appointed assistant manager of mechanical sales of the Baltimore branch.

Mr. E. P. Cole of the Denver sales

organization has been appointed manager of mechanical sales of the Denver branch. Mr. Cole has filled the positions of western manager mechanical division, manager mechanicals in Minneapolis, and manager mechanicals in Columbus since joining the company in 1910.

C. H. Joy Appointed Pittsburgh Representative of Wheelco Instruments Company

Mr. C. H. Joy was recently appointed as representative of Wheelco Instruments Co. in the Pittsburgh district. Mr. Joy graduated from Clarkson College of Technology, Potsdam, N. Y., with a B. S. in E. E. in 1929. In the summer of the same year he became associated with the Westinghouse Company. Since 1931 he has been connected with the heating division. His work at East Pittsburgh has been application work to a large extent.

Rutledge Joins American Foundry Equipment Company

The American Foundry Equipment Company, 555 S. Byrkit St., Mishawaka, Ind., has announced the appointment of Mr. Charles Rutledge as service representative for the Detroit district. Mr. Rutledge has had wide experience in service and erection work and his headquarters will be with Hutton H. Haley & Associates, 2918 E. Grand Blvd., Detroit, Michigan.

New Outlet for N.Y.B. & P. Products

The New York Belting & Packing Company, 1790 Broadway, New York, N. Y., has announced the appointment of Biggs-Kurtz Hardware Company, Grand Junction, Colorado, as distributors of their complete line of mechanical rubber goods in that area.

Through the facilities of the Biggs-Kurtz Hardware Company a comprehensive selection of N. Y. B. & P. products will be available.

New Outlet for Munning & Munning Products

Munning & Munning Incorporated with executive offices and factory in Newark, N. J., has appointed Pellington Abrasive Products Co., 487 Broad St., Windsor, Conn., as their sales representative in Connecticut and western Massachusetts.

Ward Leonard Electric Company Announces Appointment of Special Representative

The Ward Leonard Electric Company has announced the appointment of Mr. J. Y. Dahlstrand as special representative to handle the sale of Automatic Alternator Voltage Regulators in the Middle West with offices at 1719 South St., Burlington, Iowa. Mr. Dahlstrand has been associated in engineering capacities on turbo generators and other power plant equipment with Allis-Chalmers Mfg. Co., Westinghouse Electric & Mfg. Co., and for a number of years as chief engineer for the Kerr Turbine and Murry Iron Works Companies.

Joublanc Appointed Chief Metallurgist at Harnischfeger

An announcement has been made of the appointment of Mr. J. C. Joublanc as chief metallurgist for the Harnischfeger Corporation, 4400 W. National Ave., Milwaukee, Wis. Mr. Joublanc is well known in the metallurgical and welding research circles. For ten years he was connected with the Republic Steel Corporation.

Maas and Waldstein to Provide Free Bus Service At Electro-Platers New York Convention

A feature of the Convention of the American Electro-Platers' Society, to be held in New York, June 14 to 17, will be free bus service provided by Maas and Waldstein Company, makers of industrial finishes, Newark, New Jersey. The M & W buses will run between Hotel Pennsylvania, the Convention headquarters, and Rockefeller Center.

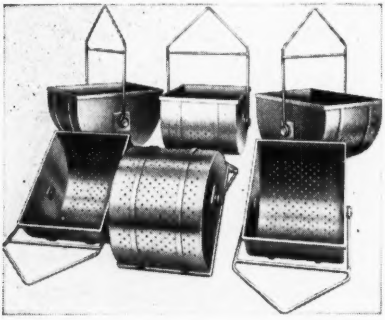
Delegates will appreciate this service, because one of the Convention's attractions, the Silver Jubilee Metal Finishing Exhibit, is located in the International Building, Rockefeller Center, which is located at some distance from the Hotel Pennsylvania.

The largest type of stream-lined buses will run between these two points on a half-hour schedule while the Convention is in session. Tickets, gratis to delegates, will be obtainable at Convention headquarters and at the Maas and Waldstein Booth at the Metal Finishing Exhibit. At this booth, some of the latest developments in lacquers, lacquer-enamels, synthetic enamels, and other finishes for metal products will be displayed.

New Plant Equipment and Materials

Kirk & Blum Pickling Baskets and Crates

Pickling baskets and crates made of the metal to suit individual requirements are being manufactured by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio. As the result of their accumulated experience,



Special Aluminum Bronze Alloy Pickling Baskets.

Kirk & Blum engineers are prepared to promptly meet requirements for any type and size of perforated buckets and baskets, crates, tubs, racks, and lead or rubber-lined steel tanks. Kirk & Blum modern manufacturing methods and skilled metal craftsmen are said to assure sturdy built and durable products.

In determining the right alloy and the correct design for a particular pickling problem, the Kirk & Blum engineering department is ready to give its assistance.

Metso 22

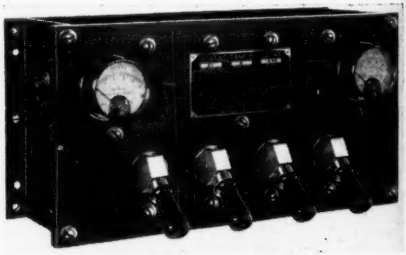
A cleaning compound recommended for cleaning of aluminum surfaces to be known at "Metso 22" has been brought out by the Philadelphia Quartz Co., 123 South 3rd St., Philadelphia, Pa. A 2 per cent solution is said to be effective on all surfaces except those most heavily contaminated. For extreme conditions an emulsion of 3 per cent Metso 22 and 6 per cent of a petroleum solvent, it is stated, quickly removes the heaviest grease. The combination of cleaners is free rinsing and leaves a clean, dry surface.

Udylite Rheostat

A rheostat which is said to smooth out current "peaks and valleys" by providing close control over the current entering the plating bath has been placed on the market by The Udylite Company, 1651 E. Grand Blvd., Detroit, Michigan. It is said to enable step up production by reducing plating time through maintenance of maximum permissible current in the tank.

The Udylite Rheostat is an instrument of precision and is built to stand the hard knocks of continuous service in the plating room. It is cam-type, with self-cleaning switches governing resistors made of helically coiled, nichrome wire. The coil brackets have large radiating surfaces, thus insuring cool resistor contacts. The ammeter and voltmeter instruments are of highest quality.

The Udylite Rheostat is furnished for all electroplating processes in sizes from 15 to 5,000 ampere rating with voltage



Udylite Rheostat

drops from 1 to 5. The higher voltage drop rheostats can be made to special order.

THE LEA METHOD

LAMPS AND OTHER ARTICLES

Given an Attractive

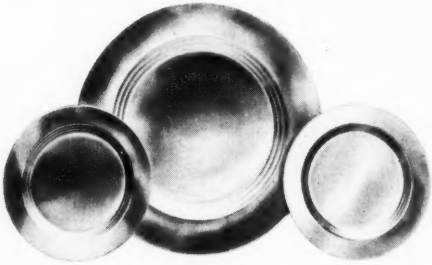
SATIN FINISH

at very low cost

● Further details of this excellent finish and of the savings LEA Polishing and Buffing Compounds provide are given on the reverse side.

BRASS LAMPS

STAINLESS STEEL SERVICE PLATES



CHROME-PLATED COFFEE SETS

Attractive Merchandise

Satin-Finished *by* THE LEA METHOD

The articles shown are but a few of the many finished with LEA COMPOUND, the trade's greaseless composition. Lea Compound cuts costs because it eliminates from one to five steps usually considered necessary.

• • •

Then, there are other articles which are given high lustre finishes with LEAROK, the composition without free grease.

Lea Technicians are authorities on polishing and buffing. LEA Products are widely used, being considered best both from an economy point of view and that of the finish produced.

THE LEA MFG. CO.

WATERBURY, CONNECTICUT

Canadian Agents: LEA PRODUCTS CO.

686 Notre Dame Street, West Montreal, Canada

Duralite-50 Goggle

A type of goggle designed for chippers, grinders, or other workers whose unprotected eyes might possibly be

Duralite-50 Goggle

struck by chips, to be known as the "Duralite-50" Goggle, has been placed on the market by the American Optical Company, Southbridge, Mass.

Individual eyecups of light, durable composition, are shaped to the anatomical structure of the orbit of the eye, that is, left cup for the left orbit, and right cup for the right orbit. The edges are rounded for comfort. Perfect fitting prevents the entrance of glancing particles and in addition to providing efficient protection for the eyes, the goggle is light, cool, and comfortable.

Air channels in the edge of the eyecup under the lens, in addition to minute perforations in the sides of the goggles, provide for a natural draft inside the cup and also provide ample ventilation in normal atmosphere to keep the eyes cool and the lenses clear. A ball chain bridge permits easy adjustment of the goggle to fit the individual wearer.

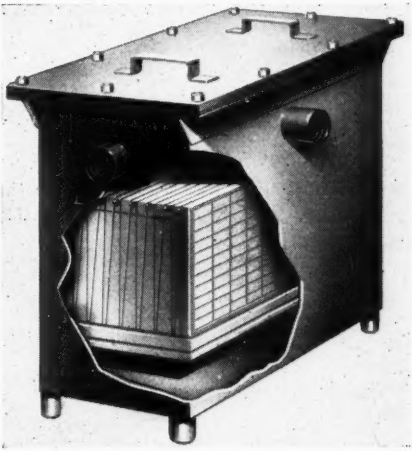
The close fitting eyecups give a wide angle vision, and thus provide better sight.

Bitumastic Black Solution

A protective coating to be known as "Bitumastic Black Solution" is now being marketed by the Industrial Division of the Walles Dove-Hermiston Corp., 17 Battery Place, New York, N. Y. In addition to Bitumastic Black Solution, this company has brought out Chromastic Aluminum Paint—a product with a rust inhibiting vehicle identified by the opaque yellow color; Bitumastic Exterior-Interior Paint—a general all purpose coating; Florex Floor Enamel; Bitugloss Industrial Enamel—for machinery and equipment; Thermastic High Heat Aluminum; Chromastic Metal Primer and Bitulite Mill White.

Mahon Renewable Strainers

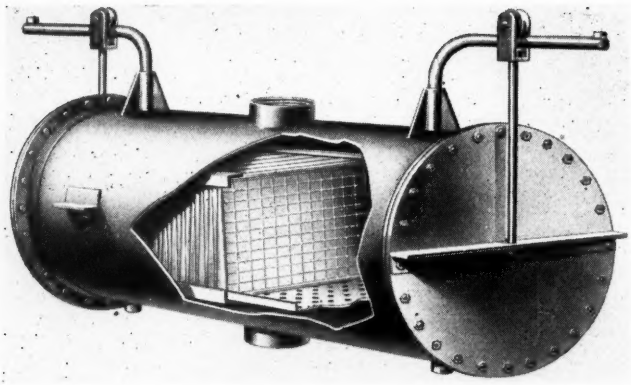
To solve many of the problems experienced in connection with Hydrofilter spray booths and industrial wash-



Mahon Rectangular Type Renewable Strainer

ing machines where recirculated water requires an efficient strainer with a minimum resistance to flow, R. C. Ma-

CUT YOUR HOUR COSTS
INCREASE YOUR PRODUCTION
PACKER AUTOMATIC
POLISHING and BUFFING MACHINES
THE PACKER MACHINE CO., MERIDEN, CONN.
WRITE FOR CATALOG — SEND PART TO BE FINISHED



Mahon Cylindrical Type Renewable Strainer

hon Company, 8650 Mt. Elliott Ave., Detroit, Mich., has placed on the market a rectangular type and a cylindrical type strainer. The capacities range from 60 g.p.m. to 840 g.p.m.—rated capacities providing 1 sq. ft. of filter area for each 5 g.p.m. handled.

The filter packs of the renewable strainers are easily removed and reloaded.

Hardy Chromium Plating Addition Agent

An addition agent for chromium plating solutions has been developed by Charles Hardy, Inc., 415 Lexington Ave., New York, N. Y. The purpose of this addition agent is to step up the efficiency of the chromium plating bath, and to secure better throwing power, both for hard chromium plating on steel and for decorative chromium plating. The chromium reagent is a specially prepared chemical compound, stable in the presence of chromic acid and under the influence of heat and electric current.

According to those who developed this reagent, it is not subject to oxidation nor does it adversely effect the various chemical reduction stages of the chromic acid during electrodeposition. The chemical effect is said to assist in the reduction of the chromium ion to the metallic chromium. It is claimed to give 20 per cent greater efficiency over a wide range of varying current densities, resulting in greater throwing power and increased coverage in the recesses in the objects being plated and thus eliminates the need for complicated racking devices, guard wires, and so on.

The deposit obtained is said to be close grained, practically free from occluded hydrogen and does not flake or chip from the base metal. With the use of this reagent, the chromium solution does not have to be controlled within very narrow limits.

Hilo Hammerkraft

A finish for application on such work as elevator cabs and doors, metal trim, burial caskets, novelties, radios, and other products having porous surfaces which have been sealed, to be known as "Hammerkraft", has been brought out by Hilo Varnish Corporation, 42 Stuart Ave., Brooklyn, N. Y. Many color combinations may be obtained by mixing metallic powders or pastes with Hilo Hammerkraft. The Hammerkraft effect is produced in a two coat application of the same material, each coat, however, being applied differently. The true rounded hammered effects are said to be obtained readily after the second coat of Hammerkraft finish.

Coleman pH Electrometer

Consistent accuracy through its reproducible conjunction and absence of grid current error is said to be insured by the Coleman pH Electrometer Model 3C. Direct pH tests are only a matter of seconds with the Coleman unit.

MASKALACO
A MASKING PASTE

For use in multicolor lacquering, painting, enameling, screen processing, etc. Striping and decorating more effective—less costly—with Maskalaco. Write for full details and sample.

CLEAVELAND
LABORATORIES & MFG. CO., INC.
447 Wilson Ave., Newark, N. J.

The reference electrode of Model 3 is made, tested and sealed at the factory and mounted in a heavy rubber stopper within the KCL reservoir. It does not require periodic refilling and cannot become contaminated with the sample to introduce erroneous readings. Only a few seconds' time is said to be required to purge the cell chain and form a fresh liquid junction for every test. The sample cup is instantly removable and readily cleaned. It is mounted in such a manner that contact with glass electrode is impossible and is so small that only 3 to 4 millimeters of the sample are required for a test.

The glass electrode is instantly removable to allow wiping away of any solid material that may cling to the glass surface and is sufficiently strong to allow tests on heavy jells or pastes. The silver-silver chloride inner electrode is extremely stable and the inner electrode system is so modified that it has a very low temperature coefficient, substantially eliminating this temperature error without recourse to unstable systems that require periodic removal.

The potentiometer system is said to avoid "working cell drift". Model 3 is of conventional design except that a second pick-up arm is incorporated. This "AP" corrector allows primary calibration against a standard buffer, thereby avoiding dependence on assumed electrode potentials and assumed ambient temperatures. The precision potentiometer is engine wound with manganin wire and fully aged before calibration. Double armed and silver plated rotary switches assure positive action and long service. High resistance circuits are all mounted and switched on isolantite insulated members. Calibration is against a contained and unsaturated Weston type standard cell.

Coleman pH Electrometer.

Because of the very high resistance of any glass electrode, it is imperative that this member be completely protected from stray currents. Ample insulation prevents such strays from entering through the potentiometer circuit, and the electrode is further protected from any possibility of grid currents by feeding the amplifier only through a very high resistance condenser. Only a single pulse of energy can pass this condenser, thus the electrode cannot become polarized, and grid currents cannot feed back through a direct connected grid. Prolonged tests have indicated impulse amplification to be a

INDUSTRIAL BASKETS

PICKLING • WASHING
CENTRIFUGAL DRYING
DEGREASING • PLATING
ANNEALING • HARDENING
QUENCHING

ROLOCK, INC.
40 STATION STREET • SOUTHPORT, • CONN.

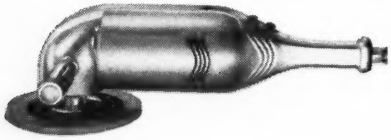
sure means of maintaining consistent accuracy.

The Model 3 electron amplifier is said to respond definitely to 0.3 millivolt (0.005 pH). An automatic unloading circuit protects the meter from extreme out of balance tests while the same meter also indicates the remaining service available in the batteries. The amplifier, standard cell and other circuits are safely housed within a strong metal base. Tubes are locked within a second case allowing easy access if necessary.

Model 3 is small, light and completely self contained, a compact, portable instrument. It is able to withstand the hard knocks incident to service. Tubes are rubber cushioned within a metal housing while batteries are firmly retained by rubber slabs. The usual galvanometer has been replaced by a rugged well designed jeweled meter.

Skilsaw 7-In. Disc Sanders

Skilsaw, Inc., 3334 Elston Ave., Chicago, Ill., has augmented its line of Skilsaw portable electric tools by the addition of a 7-in. disc sander made in



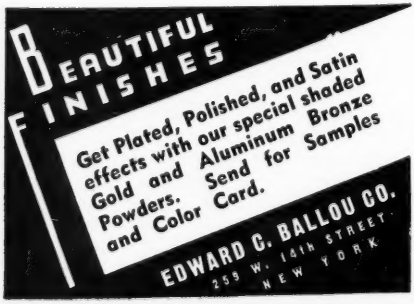
Skilsaw 7-In. Disc Sander

two models, one for heavy duty and one for constant production service.

The sander is built into a body of streamlined design and is said to be perfectly balanced and of unusually light weight. Comfortable grip handles assure complete control under heavy sanding loads. An efficient air filter protects the commutator and motor from abrasive dust and dirt. The motor has ample reserve power to insure a long life and provide the maximum of speed in sanding and grinding.

Straight-line ventilation assures a cool-running tool. Ventilating ports are located so as to blow the dust away from the operator and prevent clogging. All ball bearings are fully sealed against dust and grease leakage. The bevel gearing is sturdy and quiet in operation.

The heavy duty Model G 7-In. Disc Sander is 16¾ in. long and weighs 12½ lbs. The continuous production Model L is 16¾ in. long and weighs 14 pounds.


BEAUTIFUL FINISHES
Get Plated, Polished, and Satin effects with our special shaded Gold and Aluminum Bronze Powders. Send for Samples and Color Card.
EDWARD C. BALLOU CO.
295 W. 14th STREET NEW YORK

Camelyte Process

A remarkable advance in the development of protective finishes for iron, steel, and brass is said to be made with the "Camelyte Process", which has been recently developed by The Plating & Galvanizing Co., Broadway & Henry St., Cleveland, Ohio. This finish is applied by the electrolytic method and is said to resist the most severe tests for rust and abrasion. Camelyte can be applied over the base metal and only one coating is required.

Camelyte is an exceptionally bright and hard finish. Its brightness is much whiter than chromium and although often compared to highly polished silver, it is said to be considerably more brilliant than this metal. In the electrolytic bath it is deposited in a very close grained structure, forming a protective coating that is virtually fused to the base metal. It becomes, in fact, practically an integral part of the base metal and no amount of twisting, bending, or severe use will cause it to crack or chip off.

This highly attractive finish provides an exceedingly serviceable rust proof coating. In accelerated corrosion tests it has been subjected to a strong salt water solution for a period of 500 hrs. without showing the slightest disintegration. Samples of it have been left out-of-doors to determine what the corrosive effect of the atmosphere would be. After more than a year and a half, there was no indication whatsoever of corrosion attacking the Camelyte finish.

Camelyte can be recommended as an excellent protective finish for a great variety of articles ranging from small hardware fittings to metal furniture. It not only keeps the plated article in good condition for an indefinite period of time, but gives it new beauty that

means increased sales for the merchandiser and greater satisfaction for the user.

B. Lange Gloss Meter

Pfaltz & Bauer, Inc., Empire State Bldg., New York, N. Y., has placed on the market a photoelectric gloss meter to be known as the "B. Lang Gloss Meter". This gloss meter serves for the objective determination of the gloss and polish of metals, enamel, and so on. It may also be used for the measurement of diffuse reflection and translucency.

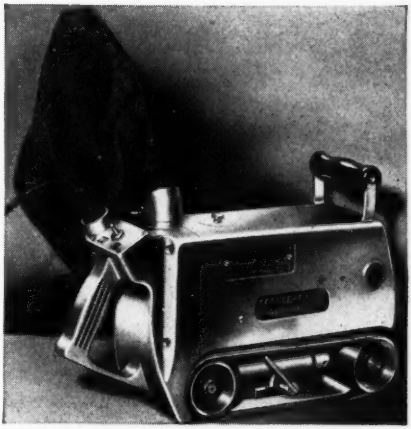
The gloss meter is suitable for the blackening determination of photographic papers. In this case, a measuring diaphragm is placed upon the specimen so that narrow strips corresponding to the customary sensitometer tests

B. Lange Gloss Meter

can be measured. A 200 mm. long scale assures a high degree of measuring accuracy.

Porter-Cable Portable Belt Sander

A four-inch, heavy duty, portable,



Porter-Cable Portable Belt Sander

dustless Take-About sander-grinder, Type T-4V, has been announced by the Porter-Cable Machine Company, Syracuse, N. Y. This machine was designed and built to perform heavy, constant sanding and grinding operations. It is equipped with a 1¼ h.p. universal motor mounted parallel to the sanding belt shoe. The frame is made of aluminum alloy for lightness and portability. An ample motor cooling system is provided through a gridded intake at the front, a commodious air circulation chamber exhausting through a grid on each side at the rear.

Between the rear end of the transmission and the guiding handle, a powerful vacuum dust collecting system is installed. The vacuum intake extends across the full four-in. width of the abrasive belt, drawing up the dust into a dust bag equipped with zipper opening

STOP REJECTS *on Highly Polished Surfaces*

Write for
FREE SAMPLE
and instructions for use.

USE PROTEX

Assure yourself that your product will reach your customer without scratches or discoloration. Easily applied and removed . . . inexpensive.

HAYDN F. WHITE & CO.
1740 E. 12th St., CLEVELAND, OHIO

for emptying.

The abrasive belt operates flush with the right side of the frame to work right up to upright objects. A flat, lever-type adjustment allows for instantaneous belt change. The transmission consists of worm and worm gear of high helical angle. The worm may be inspected through a large opening in the top of the frame. The abrasive belt size is 4 in. wide by 27 in. circumference.

Uses for this portable sander are numerous, among them being resurfacing of school desks, tables, cabinets, sash, doors, boats, and so on, and for grinding down metal strips, plates, grills, and other metal parts. For the honing of marble edges, resurfacing slate blackboards, smoothing glass edges, and sanding or grinding composition materials, including plastics, this new sander is said to do a quick, smooth job.

Udylite Rubber Pail

An acid proof, non-breakable rubber pail has been brought out by The Udylite Company, 1651 E. Grand Blvd., Detroit, Mich. The Udylite Rubber Pail is strong and durable, being made of prime virgin latex carefully compounded to give high tensile strength in one-piece seamless construction. An added feature of this pail is a detachable stainless steel handle which provides rigidity around the entire top periphery of the pail. The capacity is 12 qts., the size being 11 in. diameter and 10 in. deep. The weight of the pail is 6½ pounds.

Udylite Rubber Pail

ANTI RUST COATINGS

ALL TYPES FOR ALL KINDS OF METALS . . . FURNISH POSITIVE PROTECTION . . . TO SUIT YOUR PARTICULAR REQUIREMENTS, AIR DRIED OR BAKED. WRITE FOR INFORMATION.

ROWE PAINT CO.

43-40 Tenth St., Long Island City, N. Y.

United Chromium Color Plating Process

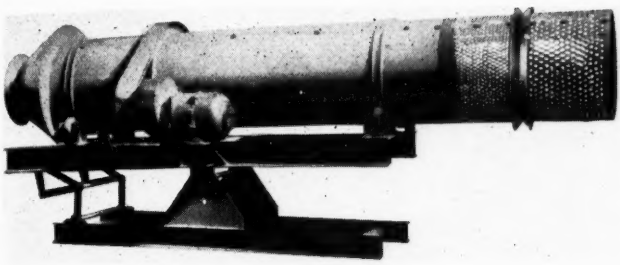
An interesting process, which is soon to be introduced by United Chromium, Inc., 51 East 42nd St., New York, N. Y., consists of coloring for metal articles. The process is covered by patents and it is stated that it is possible to obtain, by the electrolytic method, surface coatings of almost any desired color or shade. It can be applied on articles of various types and descriptions and on nearly all base metals. It is stated that the process has the advantages of moderate cost of installation and operation, together with great throwing power. The great throwing power is said to contribute to its flexibility and ease of handling.

The trade-mark "Electrocolor" which is used in connection with articles colored by this process has been registered in the United States Patent Office. A public announcement of this process is soon to be made in an endeavor to make it available to users throughout the country.

Barber Tumbling Machine Model 4

A continuous operating tumbling machine which provides a convenient method of tumbling metal stampings, forgings, and similar metal products, to be known as the "Model 4", is being marketed by Barber Tumbling Machine Works, P. O. Box 283, Oak Park, Ill. The low capacity of the Model 4 varies with the density of the product being tumbled and also depends upon whether the machine is performing continuous or batch operation tumbling. The Model 4 is equipped to do both continuous and batch operation tumbling.

With the cylinder set about level and material being fed into it constantly, the newly introduced material is caused to crowd ahead toward the cylinder's discharge end, thus maintaining a constantly discharging stream of tumbled and screened products. By tilting the cylinder's feed end low enough to prevent any of its load from discharging, a batch load can be tumbled as long as



Barber Tumbling Machine Model 4.

may seem necessary.

Model 4 has a revolving, conical hopper welded to the cylinder. This is very convenient to shovel material into, since the shoveling height is about 36 inches. The opening through which the material passes from the hopper into the cylinder is 9¼ inches in diameter.

Two kinds of screens are used, one a perforated metal, round mesh screen of standard spacing, made from 3/16 inch plate steel, the other a woven wire, square mesh screen made of 3/16 inch wire. Each is readily removable, interchangeable and of any standard size mesh. With each machine, a screen having a ¾ inch mesh is furnished as the standard equipment. The screening capacity of a square mesh wire is said to be approximately 17 per cent greater than that of a round mesh screen of the same area and the same mesh diameter.

The machine separates the tumbled product from all sawdust, scale, and such pieces of scrap metal as will pass through the screen mesh while the load is discharging. Barber engineers are prepared to build special features onto their machines when deviations from the standard form in dimensions are necessary to meet the requirements of the customer.

Metanol

An anti-pitting agent for nickel plating solutions, to be known as "Metanol", is being marketed by MacDermid, Inc., 526 Huntingdon Ave., Waterbury, Conn. Metanol is said to be an alkyl arromatic sodium sulfonate which is highly soluble in acid, neutral, or alkaline solutions. In addition, it is said to possess strong wetting and emulsifying powers and in very low concentrations, to reduce the surface tension and interfacial tensions of solutions to a minimum. The action of Metanol in the nickel plating solution is to reduce the interfacial tension between the bubble and the metal, thereby causing the bubble to be released and to rise to the surface of the solution as soon as it begins to form.

The nickel plate as a result of this action is free from pitting and gas channeling and is whiter and brighter and has a fine grain structure. The plate is also relatively soft, making buffing easier and is extremely ductile when produced on current densities up to 70 amps. per sq. foot.

In cathodic or anodic alkaline cleaning baths the use of ¼ to ½ oz. per gallon of Metanol is recommended. It is stated that cleaned work is easier to rinse and that the life of the cleaning bath is extended to about twice its normal length.

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Makes Wheels Cut 3 to 5 Times Longer!

FLEXEMENT is quickly and easily applied and produces a flexible head that cuts faster and longer—Can be forced dried—Eliminates glue pots, cooking, air conditioned wheel rooms, etc.—Users report savings up to 60% over old methods.

FLEXEMENT is available in 3 types for grains up to No. 300. Shipped in 50 lb. and 750 lb. containers. **Order today.**

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Duriron Corrosion Resisting Process Equipment

A high silicon iron alloy, containing approximately 14.5 per cent silicon, for use in making almost any piece of apparatus that can be made in cast iron is offered by The Duriron Company, Inc., 450 N. Findlay St., Dayton, Ohio. Duriron is extremely resistant to nearly all kinds of corrosives and hence is particularly adaptable in the chemical and allied industries. Duriron is very hard, resists abrasion and scouring.

Duriron is adaptable to equipment such as pumps, valves, cocks, pipe and fittings, ejectors, jets, agitators, heat exchangers and special equipment.

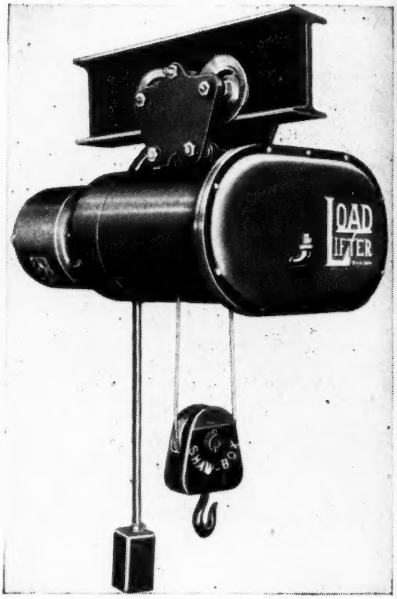
"Load Lifter Junior" Hoist

A new small low head-room type electric hoist, built in sizes to lift 350 and 700 lbs., has been placed on the market by Shaw-Box Crane & Hoist Co., Inc., Muskegon, Mich., under the trade name "Load Lifter Junior".

The hoist is a replica of the larger capacity low head-room electric hoists manufactured by this firm. With them the distance from the bottom of the track on which the hoists operate to the hook when in its highest position is less than that of a chain hoist suspended from a trolley, being only 12¾ inches.

This small hoist has a lifting speed of 20 ft. per minute with rated capacity loads, and gives a hook lift of 18 ft. Control is by push buttons contained in a unit suspended from the hoists. The hoist is comparatively light in weight, weighing only 185 lbs. ready to operate, complete with trolley.

Mechanically the hoist is of simple design. The gear train consists of only two gears and pinions. Ball bearings are employed at every bearing. The motor is of the totally enclosed ball bearing type. The hoist is equipped with two brakes; an electrically operated motor brake and an automatic mechanical load brake of the roller ratchet type that controls the load during lowering so that the lowering speed is approximately the same as the hoisting speed.



"Load Lifter Junior" Hoist

The hoist is of totally-enclosed designs, all parts being built into the hoist frame. The gearing and mechanical load brake operate in an oil bath.

Westinghouse De-ion Linestarters

A complete new line of linestarters employing the De-ion principle of arc interruption has been announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These linestarters are designed for across-the-line starting for single phase and polyphase squirrel cage induction motors and as primary switches for wound induction motors. They are especially applicable where push button control is desired with complete protection to the operator, the motor, and the machine.

All parts are accessible from the front, are self insulated and mounted on a steel base. Motor protection is provided by a thermostat disc overload relay. A

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2431 SCOTTEN AVE.
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Westinghouse De-ion Linestarter.

proper inverse time characteristic prevents shut downs due to temporary overloads. Reliable protection is assured against single phase and locked rotor operation. Heaters for operating the disc are interchangeable and easily accessible. The relay can be arranged for either manual or automatic reset.

The contactor is compact and accessible, the entire assembly being removed from the cabinet by loosening one screw which clamps the steel base in place against rubber pads. Vertical straight line operation of the contactor prevents accidental closing. The arc box is a heavy one-piece, non-carbonizing porcelain section with openings to permit inspection of contacts without stopping production. The De-ion arc quencher confines, divides, and extinguishes the arc almost instantaneously and without the usual flash and attendant scattering of the flame. This is said to give not only unusually high arc rupturing ability but also assures long life of the contacts.

Durheat Lacquers

A line of clear and pigmented air-drying lacquers, specially designed for finishing electrical equipment and other products normally subjected to elevated temperatures, has been developed by Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. These finishes, to be known as "Durheat Lacquers", are said to retain their flexibility, color, and adhesion at temperatures up to 300 deg. F. They are said to be especially applicable for direct and indirect lighting fixtures, lamp enclosures, radiant heaters, electric signs, electric ranges, ovens, and similar equipment.

Durheat Lacquers are obtainable in clear, black, white, and a variety of other colors, and can be applied by either dipping or spraying. It is stated by the manufacturer that they can be applied directly to any metal with the exception of polished chromium. When used on the latter metal, the surfaces to be finished should be first covered with a baked coating of Chroprime.

Mathews Shock-Absorbing Roller Conveyor

To meet the conditions set up by modern industry and the task placed by these conditions on roller conveyor systems, Mathews Conveyor Company, Ellwood City, Pa., has developed a shock-absorbing, resiliency mounted roller conveyor. The constantly increasing demands on roller conveyors have necessitated the construction of conveyors of heavier design, which theoretically would take care of the task. However, actual tests have proved conclusively that loads

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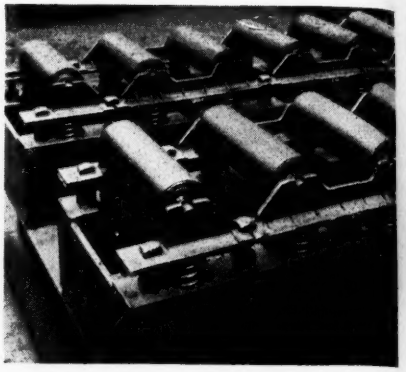
are of uneven weights and skids are often distorted with the result that a load, instead of being distributed over a number of rollers, may be carried by only two or three rollers with the result that these rollers support many times the load theoretically calculated. This uneven distribution of the load and overloading of rollers has been reflected in the maintenance costs of the conveyors which in certain cases have reached a nearly prohibitive point. The problem thus has resolved itself into that of finding some means of causing each roller to carry its proportionate share of the load.

The Mathews Shock-Absorbing Roller Conveyor is mounted on heavy springs mounted on L-beams which are, in turn, mounted on heavier springs on still heavier L-beams which are solidly supported. For example, the Type 53 conveyor roller is 2-9/16-in. diameter and is mounted in 3x3x5/16 L-beams supported by 2½ O.D.x⅜ in. coil springs on 3½x3½x½ L-beams. From actual tests and six months' constant use, it has conclusively been determined that this resiliency in the roller mountings permits each roller under a given load to carry its proportionate share of the load. Bearing friction is reduced to normal. The result of this is that the coefficient of friction used to calculate the effort required to move loads over a roller conveyor of this type has been reduced considerably. In testing the conveyor referred to, conditions were set up to duplicate certain conditions which have been found in actual practice, such as the lowering of a crane magnet onto a load on a roller conveyor, thus adding the weight of the magnet to the load temporarily and heavily overloading the rollers. Again, heavy loads were dropped on the resiliently mounted conveyor rollers, subsequent inspection disclosing that the springs absorb the shock and prevent injuries to the rollers or their bearings.



Mathews Shock-Absorbing Resiliently Mounted Rollers in a Typical Roller Conveyor

Magnus No. 78 Cold Cleaning Compound

A cleaning compound designated as No. 78 for the cold cleaning of metal parts by the Magnus process of emulsion degreasing has been brought out by Magnus Chemical Company, Inc., 10 South Ave., Garwood, N. J. Magnus No. 78 will attack paint and is non-corrosive to metal. With the use of Magnus No. 78, lacquer, enamel, and paint can be completely removed by the simple wetting through and loosening of the bond between the metal and the coating. The lacquer then comes off in sheets. Since the action is primarily physical and not chemical, Magnus No. 78 solutions are said to have a long life.

An emulsion of Magnus No. 78 is said to be safe for any metal including duralumin and magnesium alloys. Grease, oil, paint, and lacquer are quickly removed in this solution.

Metalwash Cold and Hot Blast Drying Machine

A Cold and Hot Blast Drying Machine for the spotless drying of plated parts has been brought out by the Metalwash Machinery Co., Inc., 117 East 24th St., New York, N. Y. This machine is said to be especially adapted to the drying of tin plated evaporator boxes for refrigerators, and the like. The parts after plating are rinsed in clear, cold water

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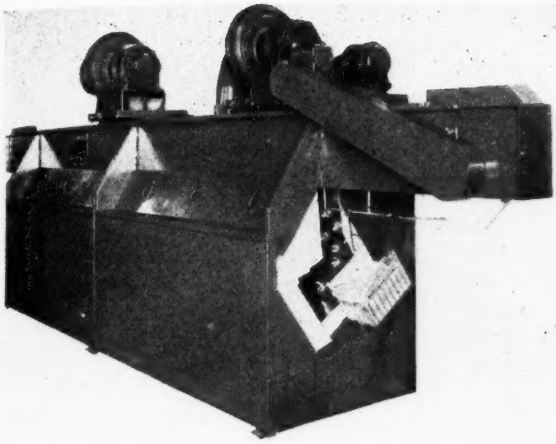

Metalwash Cold and Hot Blast Drying Machine

and are then passed through the machine in the first compartment where they are subjected to blasts of cold air which strip off approximately 85 to 95 per cent of the large globules of moisture, leaving only a film of moisture on the parts which is then easily evaporated in the hot blast section.

This type of drying is said to result in practically spotless work so that the necessity for removing water spots and stains is eliminated. The machine can be adapted to a wide variety of plated work, either racked or hung individually.

E. Reed Burns Crocus and Lime Varnishes

A combination of crocus and lime for color buffing on brass or copper where the nickel after plating is not to be buffed has been developed by E. Reed Burns Mfg. Corp., 24 Jackson St., Brooklyn, N. Y. The addition of crocus is said to give a definitely deeper and higher color to brass or copper than is possible where white lime is used alone.

The material is used in the same manner in which conventional white lime is used, on a loose or loosely sewed muslin buff at 7,000 or 8,000 surface feet per minute. So far, two grades of pink lime have been developed, namely "C-H" Pink Glo-Lime and M-28 Pink Hi-Po-Lime. The M-28 is a faster cutter than the "C-H" grade.

Rockflux

A combination of "Diabase" or "Donerite" and "Quartz" fluxed with a cement to create perfect homogeneity for floors that are subjected to lactic acids, brines, sugar, salt, and acids in the pres-

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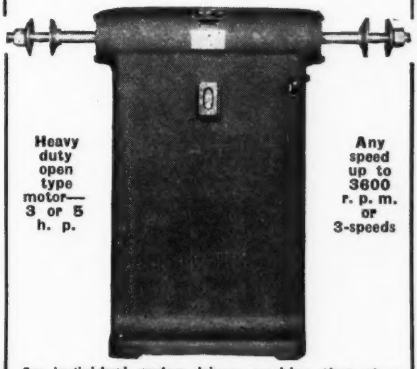

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Vonnegut Moulder Corp.

1811 Madison Ave. Indianapolis, Ind.

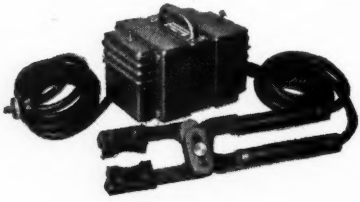
ence of moisture, to be known as "Rockflux", is being marketed by Flexrock Company, 800 N. Delaware Ave., Philadelphia, Pa.

Rockflux is said to produce a hard, firm, smooth surface capable of withstanding thousands of pounds per square inch. The surface can be immediately walked upon without marring. It can be installed on wet surfaces. It is said to withstand tremendous heat and abuse.

Rockflux bonds with old concrete. It is said to be an ideal material for patching.

Thermo-Grip Electric Pliers

An electrically heated soldering pliers for soldering large work, to be known as the "No. 10", has been placed on the market by the Ideal Commutator Dresser Co., 4004 Park Ave., Sycamore



Thermo-Grip Electric Pliers

Ill. These pliers are used for soldering lugs up to 1050 amp. or sweating pipe fittings up to 2½ in. diameter under continuous operation. When used only intermittently, the No. 10 pliers will handle pipe or fittings up to 4 in. in diameter.

Ideal Electric Pliers are said to sweat joints without unsweating adjacent connections, hold work firmly while soldering, heat work evenly from both sides, and eliminate open flame. The line current from which they operate is reduced to a harmless low voltage so that no electric shock is possible.

Dural HS 756 R

A black lacquer to be known as "Dural HS 756 R" has been brought out by the Sewall Paint & Varnish Co., 1009 West 8th St., Kansas City, Mo. This type of lacquer is said to build a full lacquer film very quickly, since it can be supplied in concentrated form. With one or two coats of this material a full lustrous film is developed with a minimum of orange-peel effect.

It is said to have the highest known solid content at operating consistency. It is said to eliminate scratches around repair spots on lacquer and to mask minor finish imperfections because the film does not shrink. It is also said to show no lifting on touch-up enamels.

Cellufoil

A transparent protective coating for all kinds of bright metal surfaces, to be known as "Cellufoil", has been brought out by the Evans-Walton Co., 243 W. Congress St., Detroit, Michigan. This coating is applied as a liquid, and is said to harden quickly and become a tough adherent top layer, which will preserve indefinitely the metal lustre of the polished metal. It can be applied by the ordinary brush method.

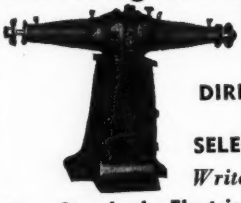
Cellufoil is recommended as a protective coating against the destructive action of salt. It is not a lacquer or polish, nor for use on painted, enameled or lacquered surfaces. Its primary function is as a protective coating on exposed metal parts, such as on automobiles, marine equipment, and so on.

Mulsite B-14

A cleaning compound, to be known as "Mulsite B-14" has been brought out by the Ward Chemical & Mfg. Co., Inc., 53 Park Place, New York, N. Y. This compound is recommended for still tank cleaning of iron and steel parts, disassembled machinery, tools, and so on, prior to overhauling, re-assembling and stocking for future use. It can also be used in metal working plants for the removal of mineral oil base cutting, quenching, tempering, and slushing.

Other applications are wet tumbling of ferrous metal parts prior to tank cleaning, removal of quenching and tempering oils in heat treating departments, and cleaning ferrous metals in washing machines prior to slushing for rust prevention.

Buffing & Polishing Lathes



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Tem-Pro-Kote

A method of protecting plated products from damage after they leave the plant, to be known as "Tem-Pro-Kote", has been brought out by Collord, Inc., 7049 Lyndon St., Detroit, Mich. Tem-Pro-Kote is an adhesive used to attach paper to chrome plated surfaces to provide protection against abrasion, salt corrosion, and so on. The Tem-Pro-Kote system is patented and is sold under a license, the purchase of the adhesive carrying the right to use the system.

Walker-Turner Series 700 Belt-and-Disc Surfacer

An efficient, practical machine for surfacing or grinding metal, plastics, and so on designated as "Series 700" is being marketed by Walker-Turner Company, Inc., 2137 Berckman St., Plainfield, N. J. With this type of machine, operations may be done at single or compound angles from 90 deg. to 45 deg., on either disc or belt. Correct mitered joints are formed with precision and speed. Stock up to 13 in. in width may be handled easily.

"Stroke" finishing where the work rests on the adjustable shelf, and the lower section of the abrasive belt is pressed against the work with the "stroking block" is an added feature on this machine. The bed is of heavy cast iron accurately machined and has a built-in belt and pulley guard. The ball bearings are completely dust sealed, being packed with grease at the factory, thus requiring no further attention or lubrication.

The pulleys are aluminum die castings, 5in. in diameter and accurately balanced. The drive pulley is rubber faced and slightly crowned. The belt is aluminous oxide, fabric backed, available in 36, 60 and 120 grits. The belt is 53 in. long and 4 in. wide.

The disc is 10 in. in diameter, cast iron and carefully balanced. It is faced with aluminum oxide disc, available at 40, 60, and 80 grits. The machine speeds are 765, 1350, and 2275 r.p.m. The abrasive belt speeds are 1050, 1760, and 3100 ft. per minute. Mitre gauge is furnished as standard equipment.

The bench on which the unit is mounted is of all-steel construction and includes a motor bracket. The overall length is 29 inches.

Hargy Rebuilt Buffs

Considerable economy is possible by the use of rebuilt buffs according to a statement made by the Hargy Buff Company, Lockland, Ohio. Rebuilt buffs made by the Hargy Buff Company are custom-made to order and are said to give satisfaction to a large number of users over a long period of time. In addition to rebuilding customer's buffs, this company has a large number of rebuilt buffs available.

Dipwite

A beautiful, decorative finish applied by the dipping process for brass or copper, to be known as "Dipwite", has been

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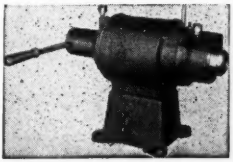

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brought out by Special Chemical Corp., 32 Irving Place, New York, N. Y. Dipwite is said to work very well on brass or brass plated articles, copper or copper plated articles and produces a white finish that is highly tarnish resisting.

An Analysis of An Installation of Dust Suppression Equipment. By Hugh E. Keeler of the Department of Engineering Research, University of Michigan. This report outlines the testing equipment and apparatus, method of conducting the tests, and results of tests that were made by the University of Michigan Department of Engineering Research to determine the dust collecting efficiency of a Schneible "Multi-Wash" Dust Collector installed in Building No. 70 of the Buick Motor Company, Flint, Mich. This building is one of the important buildings in the large foundry group and the No. 6 molding equipment unit is the newest and of the most advanced design. The dust collector is nominally rated at 30,000 cu. ft. per minute and was designed, manufactured and installed by the Claude B. Schneible Company, 3951 Lawrence Ave., Chicago, Illinois.

The dust collector is a heavy duty, high efficiency type for handling air that is very heavily laden with dust and other impurities. In the course of the test a determination was made of the amount of dust in the air at the breathing line (nose level) at the shake-out of the No. 6 molding equipment unit and in the air at a point nine feet behind the operators at the shake-out and midway between them. The tabulated results of the tests show the average total pressure; inches H_2O, at the various points indicated, the average static pressure; inches H_2O, average velocity pressure, inches H_2O, the dry bulb and wet bulb barometer readings, relative humidity, millions of dust particles per cubic foot of air, total solids per cubic foot of air in grams and total solids in pounds, total silica (SiO_2) per cubic foot of air in grams and in pounds, silica (SiO_2) per cent, all other solids; per cent, fan speed r.p.m. and motor speed r.p.m. The report includes a clear description of the conditions under which the tests were made and shows a number of photographs of the interior of the foundry and the dust collector as installed. Copy will be sent to any mechanical engineer who will address the Claude B. Schneible Company at the above address.

"Prevention of Heat Sickness." The successful application of research to an old industrial problem is outlined in a 32-page book which is now being distributed by Fairway Laboratories, Inc., Belleville, Ill. "Heat sickness" has come to be recognized as an important problem in steel mills, heat treating plants, and other plants and departments which depend upon high temperatures for processing. The problem has baffled medical science for many years. Industrially, heat sickness has the most disastrous effect on both individual and group production due to the afflicted workman having to instantly surrender whatever mechanical process, tool or material with which he is engaged at the moment. Inasmuch as orderly shop procedure is one of the requirements of modern industry, the disastrous effect of having a workman quit at a most unexpected moment is obvious.

It has come to be generally known that the cramps, nausea, dizziness and general muscular exhaustion which accompany "heat sickness" are due to the sweating of an excess of salt from the muscular tissues. A simple means of replacing this salt loss by means of tablets which can be made available to the workman through wall dispensers is discussed in this book. Copy free to any mechanical executive.

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